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LECTURE.

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LIEUTENANT-GENERAL SIR ARNOLD KEMBALL, K.C.B., K.C.S.I., in the Chair.

LESSONS FROM THE LATE WAR.

By Captain JOHN L. NEEDHAM, R.M.A., Professor of Fortification, Royal Naval College, Greenwich.

SIR ARNOLD KEMBALL, Ladies, and Gentlemen: Since, in compliance with a wish expressed by the Council of this Institution, I undertook to prepare a lecture on "Lessons from the late War," it has been remarked to me by more than one Officer whose reputation as military writers and critics gives weight to any opinion expressed by them, that the time has not yet come for drawing deductions from the war of 1877; that we have not as yet sufficiently detailed and authentic information to enable us to draw conclusions from the events of the campaign just concluded. Now, Sir, it is true that no such complete and impartial narrative of the late operations in the East has as yet been published as is contained, for instance, in the German Official Histories of the Campaigns of 1866 and 1870-71 of the events recorded in those works; but, nevertheless, an immense mass of literature has already appeared, in which many of the operations of the late war are described with more or less minuteness, and discussed with more or less impartiality. In the first place we have the graphic and picturesque, and comparing them with later accounts, I should say remarkably accurate descriptions of many of the chief events in the war telegraphed home, while the scenes they described were still fresh in their memory, by the Special Correspondents of the press; by correspondents not only of English, but also of Continental papers; by correspondents, many of whom were Officers of known and proved ability, conversant with the theoretical as well as the practical branches of their profession. We have official reports of many of the principal episodes of the campaign:—such as those written by the Grand Duke Nicholas, by General Gourkho, by General Skobeleff, General Krudener, and other Officers holding high commands. We have the fragmentary but shrewd notes jotted down from time to time

by that keen observer and unsparing critic, Captain Kouropatkine of the Russian General Staff. We have the plain unvarnished narratives of non-commissioned officers and men of the Russian Army. We have the more carefully written histories of the campaign published by Mr. Norman and Mr. Williams; while other accounts have appeared lately in the pages of the Austrian *Organ der Militär-Wittenschaftlichen Vereine*, and of the Prussian *Militär-Wochenblatt;* and, finally, we have the very admirable account of the struggle round Plevna, recently published by the well-known German military writer, Captain Thilo von Trotha. Well, Sir, there is, I would submit, much to be learnt from all these accounts taken and compared together; and since I have been obliged, from various causes, to devote much time to the study of them, I propose this afternoon to lay before you a short summary of some of what seem to me to be the principal deductions derivable from the accounts I have alluded to; trusting that in the discussion which I hope may follow, remarks may be made and opinions elicited which will prevent this afternoon being recorded as altogether a blank day in the journals of this Institution.

The most convenient way of dealing with the subject before us will be, I think, in the first place, to enumerate the deductions derivable from the late war; and then, taking them in succession, indicate the particular episodes or events of the campaign upon which they are based, or which would seem to confirm the truth of them; and here I may remark that since it would obviously be simply impossible to touch upon all the points of so wide a subject in the time to which the Council of this Institution very wisely limits lectures delivered here, I shall confine myself exclusively to the tactical lessons of the campaign; leaving the broader questions of strategy, and of the administration, organization, and mobilization of armies, to be dealt with by some more competent person; and I may add, that one or two of the points to which I shall refer have already been alluded to in a lecture recently delivered in this theatre, and in the discussion which followed; but since on that occasion much more attention was given to another question raised in the same paper, it will, I think, be allowable to refer to them briefly again.

From the experiences of the late war may be adduced, I venture to submit:—

in the first place, the imperative necessity, under contemporary conditions of warfare, of utilising the power of firing at long range conferred upon infantry by modern improvements in the weapon they carry;

in the second place, the necessity for improving and perfecting arrangements both for insuring that there shall always be a sufficient supply of ammunition at hand, and also for issuing and distributing cartridges to men actually engaged; and, also, the advisability of lightening the equipment of the soldier—of decreasing, as far as possible, the weight of his kit—both in order that he may be able to move more rapidly and with less fatigue, and also that he may be able to carry about his person a greater number of cartridges than he can at present;

in the third place, the necessity of providing that there shall always be a sufficient supply of intrenching tools forthcoming and available, not only before and after an action, but also at any moment when they may be wanted during the course of a battle; and, also, the necessity for exercising men to a greater extent than is done at present in digging; of practising Officers in designing and tracing, and men in actually constructing such hasty intrenchments and field fortifications as may be employed with advantage on a field of battle, or for the defence of a position;

in the fourth place, the necessity for adding to the artillery of an army a proportion of guns of larger calibre and greater power than any now employed; and, also, of rendering the light guns of an army as mobile as possible, so that they may be able to accompany an attack as it progresses.

Such then I venture to submit are some of the most important tactical lessons to be derived from the late war. In enumerating them I have given the precedence to the subject of long-range fire, because it seems to me that the constant use of this fire by the Turks is the most striking feature in the tactics of the late war. It has been remarked that every campaign which has been fought during the last quarter of a century has been characterised either by the introduction of some new or greatly improved weapon, or by the adoption of some new tactical procedure. The Crimean War, for instance, will be remembered in history as the first campaign in which rifled muskets were used. The Italian War of 1859 as the first occasion on which rifled field-pieces were employed. The American War of Secession from the introduction of armoured men-of-war and monitors; from the employment of torpedoes, and from the more extended use of hastily improvised cover. The war of 1866 in Bohemia as the campaign in which breech-loading firearms, although only of a comparatively low power and short range, first came prominently into notice. The Franco-German War of 1870–71 as the first campaign in which far-reaching, hard-hitting, and rapid-firing arms of precision were used; whilst in the late war we have, for the first time, long-range fire constantly and systematically employed. The fire tactics of the Turks, as far as can be gathered from published narratives, and as far as I can learn from eye-witnesses who saw much of the fighting, were extremely simple, and the reasoning upon which they were based is at all events intelligible and consistent. When the Turkish authorities provided their infantry with a weapon which has a range of over 3,000 paces, and which can be reloaded and fired fifteen times a minute, they recognised that it would be to make too great a demand upon human nature, or at all events upon Turkish nature, to ask that men, armed with so perfect a weapon, should always wait patiently until the object at which they were to fire should become distinctly visible, or until an assailant, advancing to drive them out of a position, should have arrived at comparatively close quarters, before they themselves opened fire. Accepting, therefore, the impossibility of persuading their men to always carefully husband their cartridges, not to fire until the enemy had arrived within what

used to be called "effective musketry range," they decided that it would be better to let their men endeavour to utilize, to the most extreme limits, all the power of the rapid firing weapons with which they were provided; to open fire immediately the enemy came within the very longest range of their rifles, and to fire as rapidly as possible; while, at the same time, since it was inevitable that such a line of action would involve the consumption of an enormous number of cartridges, every effort was made not only to amass an immense supply of ammunition, but also to insure that the men engaged should never run short of cartridges. Accordingly, immediately the enemy came within the very longest range of their rifles, the Turks, as a rule, opened fire, and endeavoured to keep up a continuous and incessant rain of bullets over all the ground occupied by the enemy; or upon which his troops, if concealed from view, were presumably drawn up; or over which they would have to advance to the attack, entirely regardless of the expenditure of ammunition involved thereby. And there can be no doubt—we have testimony upon the point from a host of witnesses, we have the testimony of the Russians themselves—that immense loss was frequently inflicted upon the Russian assaulting columns by these means, that, on more than one occasion, the advance of the Russian lines was not only retarded but absolutely stayed; that the attack faded away; that the onslaught was for the time at all events definitely arrested by this unaimed high-angle fire, before the Russians, armed with a weapon of inferior power, could arrive near enough to the defenders to reply to the fire which was devastating their ranks. General Todleben, in a letter to General Brialmont, states that the number of Turkish bullets which fell among the Russian ranks when they were still 2,000 yards away from the defenders' position was such, that divisions which at the outset numbered from 10,000 to 12,000 men, were speedily reduced to a strength of from 4,000 to 5,000; that, in other words, they lost half their effectives. Captain Kouropatkine, speaking of the attack upon Loftcha, states that at 2,000 yards from the Turkish position, Russian soldiers were struck down by the defenders' bullets, and that at 1,500 yards, men were falling rapidly on all sides; and General Zeddeler, who was present with the Russian Guard when it received its "bap-"tism of fire" at Gorni Dubniak, states, that at 3,000 paces from the defenders' position, the Russians began to suffer loss, that at 2,000 paces men were falling rapidly, and as the attack progressed the reserves suffered nearly as much as the firing line. If it were necessary I could quote in detail a number of instances which confirm the truth of these statements; but the fact that the Russians suffered severe loss from the long-range firing of the enemy is so generally admitted, is so universally conceded, that it is needless, I think, to multiply proofs. I will, therefore, only cite a single case, which seems to me to be very instructive. Here is the narrative of a non-commissioned officer of the Vladimir Regiment, which, on the 11th of September, on the day of the last grand attack upon the Turkish lines round Plevna, formed a part of General Skobeleff's command. During the forenoon of the day, this regiment had been ordered to

move up into a position in some vineyards and maize fields, two versts, or about 2,200 yards, away from the central Turkish redoubts on the Green Hill. The most advanced of the Turkish trenches were some 200 to 300 yards in front of this redoubt, and were therefore, presumably, from 1,700 to 1,900 yards from the Russian position. After describing these preliminary movements the narrator continues: "We "had not been long in the vineyard when the Turks began to fire at "us. Many of our men were wounded before the order was given for "us to advance, and among them the Captain of my company, who "was lying down among the vines. When at last we moved forward the "bullets fell upon us like hail. They pelted upon us on all sides. "Men fell on all sides, in the front ranks and in the rear sections "alike. We had not gone more than fifty paces when the Officer of "my subdivision was struck in the chest; he died two days after-"wards. The other peleton Officer led on the company, but 100 yards "further on he was hit too. We could not fire. Our Krink rifles "were only sighted up to 600 yards, and the Turks were a verst "and a half away." Here is an instance, related by an eye-witness, of what long-range fire can do; a company loses all its Officers, becomes naturally seriously demoralised, before it can arrive within a mile of the position it has to assault. The particular battalion to which this company belonged did not, it is almost needless to say, carry the Turkish trenches. In the words of the narrator, "long "before we got near the trenches there was no one left to advance."

On the other side the Russians also, incited thereto doubtless by the losses they were suffering, endeavoured, on more than one occasion, to reply by long-range fire to the long-range fire which was galling them. The Krink rifles carried by the Russian soldiers being only sighted up to 600 yards, rough wooden sights were manufactured in some regiments and adjusted to the rifles, but as this expedient naturally could not increase the actual carrying-power of the weapon it advantaged the Russians but little, and they could not reply with effect to the fire which was devastating their ranks. One curious instance is, however, recorded of high-angle fire being used with signal success by the Russians. On the 23rd of August, on one of the days of the memorable struggle for the Schipka Pass, a Turkish force was assembled in some groves and thickets, some thousand yards away from the main Russian position. The Officer in immediate command of the section of the Russian line opposite to this hostile force, directed the men of the companies near him to raise the sights of their rifles for 600 paces, and to aim at the tops of some scattered trees, which stood half way between the Russian position and the wood in which the Turks were concealed. By this means so effective a fire was obtained that not only were the Turks unable to emerge from their woods, but were even obliged to fall back from the outskirts of the groves.

And not only on the actual field of battle, but also on the rifle range, it has been very conclusively proved that long range fire is exceedingly effective. Want of time prevents me giving details of experiments which have been recently made in Austria, France, Italy,

and Prussia, but I may mention that in some trials recently made on the Steinfeld Range, near Vienna, a party of men fired at wooden dummies set up 1,500 yards away, representing three guns in action. Of the total number of bullets discharged, 9 per cent. struck these targets; and in recent trials in Prussia, at 1,500 yards, 11 per cent. of the shots fired hit targets representing a company in line standing; 8 per cent. of the shots fired struck targets representing the company in line lying down; 22 per cent. of the shots fired struck targets representing a company in columns standing, and 16 per cent. struck targets representing the company in column lying down.

It must, therefore, I think, be admitted, that very serious loss may be inflicted upon an enemy by long-range fire. That, however, very much difference of opinion exists as to the advisability of sanctioning its employment, is notorious. The main arguments adduced by those who are opposed to its introduction may, I think, be briefly summarised as follows:—

First, that long-range fire necessarily involves the expenditure of a great amount of ammunition, and that, therefore, if men are allowed to open fire at long distances, they will be likely to run short of cartridges before the decisive moment of battle arrives;

In the second place, that long-range fire will be fatal to the offensive spirit of any force constantly employing it. That, in other words, it will be found impossible to rally forward a line of men which has once been allowed to halt at a great distance from the enemy to open upon him a long-range fire;

And thirdly, that if men are allowed to fire at long ranges, they will get into the habit of shooting wildly, and that, consequently, their fire will decrease in efficiency as the enemy draws near to the position.

Taking this last objection first, it seems to me that the evil dreaded will only make itself felt when what the Germans call the "fire dis-"cipline" of the troops is imperfect; or where Officers and men have not been sufficiently practised in the use of long-range fire. Up to the present time, long range fire has only been used by the troops of two armies, the French and Turkish, and of both of these, it is said that their fire decreased in efficiency as the enemy drew nearer to them, that the bullets fired by the defenders flew over the heads of the assailants as these latter advanced to closer quarters. Whether, however, this was always the case with the Turkish bullets seems to be doubtful. General Zeddeler, speaking again of the attack on Gorni Dubniak, says that as the Russian attacking forces drew near to the position, the rain of lead which fell upon them was such, that none but those who saw it can form any conception of what it was like; and, if I remember rightly, an Officer, speaking in this theatre not long ago, described the Turkish soldier as looking very steadily at the enemy when he fired at him at short ranges. But, in any case, it must be remembered, that both by the French and by the Turks, long-range fire was employed in an unmethodical and reckless manner. There were no regulations prescribing how, when, or where it should be used; neither Officers nor men were practised in its use; the fire

discipline of the troops was most imperfect. But if the manner in which long-range fire should be employed has been carefully thought out and worked out beforehand; if appropriate regulations have been drawn up for governing its employment; if the fire of the men be kept under control, if, for instance, they fire by volleys only, or if the firing be independent, it be ordered to cease after each man has fired a certain number of rounds, it is difficult to see why the fact of men having fired at long ranges should afterwards make them shoot wildly at shorter distances. That there is more force in the first two objections cannot be denied; but they are both of them objections which apply to the use of long-range fire by attackers rather than to its employment by defenders.

How to bring up supplies of ammunition into the firing line; how to distribute cartridges to men actually engaged, is admittedly one of the most difficult at the same time that it is one of the most important problems which has yet to be solved in modern warfare. But, on the other hand, it ought to be no difficult matter to organize arrangements which shall ensure that a stationary line of defenders shall never run short of cartridges. The number of rounds fired by the Turks during the late war was enormous. In some of the more obstinately contested struggles of the campaign, each man is said to have fired 200, 300, 400, and even up to 500 rounds; and yet I do not find a single instance recorded of the Turks running short of ammunition. Immediately a shelter trench was excavated, receptacles were hollowed out for ammunition barrels or boxes, these were kept constantly filled with cartridges, and from these the men helped themselves.

The objections, then, to the use of long-range fire apply rather to the attack than to the defence, and, therefore, it may be concluded, I would contend, that in future, long-range fire will be employed by every defensive force, especially as, by its employment, and in no other way, can loss be inflicted simultaneously upon all the lines—upon the skirmishers, supports, and reserves—of an attacking force. In his "Précis of Modern Tactics," Colonel Home states:—"It is "possible to bring up the main body of an assailing party in a much "closer formation than is often supposed, because the fire of the "defender will be mainly directed upon the assailant's skirmishers." And von Scherff also argues that, "the fire of the defender will be "diverted as the attack progresses from that portion of the attacking "force which comprises the main body, or true assaulting party, by "the necessity of checking the advanced line of the attackers, and "it is upon this diversion of the fire from the main body that the "possibility of an attack mainly rests." But, if the defensive force be disposed—as the Turks frequently were—in two or more lines, and if, by taking advantage of sloping ground, these lines are posted so that the men in rear can fire with safety over the heads of the men in front, the troops in the rear lines may keep up a high angle and exceedingly effective fire upon the supports and reserves of the attacker, whilst the men in the front line confine their attention to checking the advance of the skirmishers or foremost fighting line. But if, actuated by these or other considerations, the defender opens

long-range fire, the assailant must reply to it. In several articles on the battles of the late war, the Russian method of attack is severely criticised. The Russians are blamed for pushing on to the attack whilst still a thousand yards or more away from the defenders' position--for rushing forward to the final onslaught before the way had been sufficiently prepared for the fire of skirmishers. In other words, they are censured for not employing long-range fire. That they did not do so was owing to the inferiority of the weapons they carried. When once they could open fire, the men advanced much more cheerily. A private in the Russian Army, speaking of one of the attacks upon Plevna, said:—"This part of the advance was terrible; men were "struck down on all sides, and we could not reply. When once we "opened fire, it was not so bad; we were so busily firing at the enemy "that we did not think much of his bullets."

To conclude, then, this portion of the subject, long-range fire will, I would contend, be in future employed by every defensive force. To lend a moral support to his advance, as well as with a view of inflicting serious loss upon the enemy, the assailant must reply to this long-range fire by long-range fire, and therefore, however cogent may be the arguments urged against it, long-range fire will in future be largely employed. That this is the view of the matter taken by military authorities on the Continent may be inferred from the fact that, in the latest published musketry regulations for the Austrian and Prussian Armies, instructions are laid down for using long-range fire, or, in other words, its employment is recognized and sanctioned; and an article recently published in the organ of the French General Staff concludes with these words:—"It is time that those who object to "long-range fire should nevertheless range themselves by the side of "its convinced partizans, as at all events resigned partizans, for it "must not be forgotten that no advantage will be obtained from long-"range fire, but that, on the contrary, grave inconvenience will result "from its employment, if we practise it for the first time when its use "is imposed upon us on the field of battle. The employment of long-"range fire is too difficult and too delicate a matter to be improvised."

Intimately connected with the question of long-range fire is that of the supply and distribution of ammunition to men engaged in action; but this subject has been so recently discussed in this theatre that I do not propose now to enter upon it at any length. Since the occasion referred to, however, an article bearing upon the matter has been published by General Zeddeler, and therefore, perhaps, it may not be uninteresting to note the deductions derived by that Officer from the personal experience he gained during the late war, especially since, having previously accompanied the Staff of the Prussian Army during seven months of the campaign of 1870 and 1871, General Zeddeler was exceptionally well qualified to draw conclusions from what he saw. In the first place, after pointing out the absolute necessity of largely increasing the number of ball cartridges available in the Russian army during action, and which it may be remarked is much the same as in our own, General Zeddeler strongly insists upon the advisability of giving to the men from the outset a greater number of rounds,

suggesting that each man might carry 105 rounds, namely, 60 in his pouch, as at present, and an additional 45 in his havresack, while, at the same time, recognizing that there is a limit to the burden which it would be wise to impose upon a soldier, General Zeddeler recommends a corresponding diminution of his general equipment. The first or immediate reserve of small arm ammunition, consisting of 25 rounds per man, should be carried, General Zeddeler warmly advocates, on pack animals; and, taking 2,000 rounds of ball cartridge as the load for each animal, 30 such animals would be required to carry the first supply of ammunition for a regiment of four battalions. The second and larger reserve, consisting of 75 rounds per man, should be carried, General Zeddeler recommends, in carts or waggons. These waggons should be attached to regiments, and, on the regiment to which they belong going into action, they should be drawn up in the immediate neighbourhood of the site selected for binding up, in the first instance, the wounded men of the regiment, as the constant communication between this spot and the front would facilitate forwarding ammunition from the waggons to the men actually engaged. The waggons should be emptied in succession, and, as soon as the supplies in one are exhausted, it should be sent to the rear to be replenished. The pack animals should be attached, two to each company, and should each be accompanied by two men. The Captain of every company should look after the animals attached to his command, and should be held responsible that they always keep close up to the men, and, as soon as all the cartridges carried by one animal are served out, it should be sent back to the waggon to bring up more. In this way, every man going into action would have immediately available 205 rounds of ball cartridge: namely, 105 carried by himself; 25 rounds carried by the pack animals of his company; and 75 rounds carried in the waggons of his regiment.

Passing on now to the subject of intrenchments. It did not require the experience of the late war to teach us that a trench of even the most simple profile, adequately garrisoned, is, under certain, easily-fulfilled conditions, practically unassailable by, at all events, a frontal attack. This truth was enunciated after the American War by Major-General Barnard, of the United States Engineers, in a Report on the defences of Washington, and has since been amply confirmed in more recent campaigns. That the Turks fully appreciated the advantages to be derived from the judicious employment of hasty intrenchments and field fortifications may, I think, be gathered from the published accounts of their defensive battles. Immediately Turkish soldiers were ordered to occupy a position, they at once endeavoured to find cover for their deployed lines by utilizing the features and accidents of the ground, supplementing this natural cover, where necessary, by scooping out what in the first place were very shallow shelter trenches. As soon as possible these trenches were extended and enlarged; the excavations were deepened, the parapets increased in thickness and height. As time went on, traverses were constructed to screen the defenders against oblique or enfilade fire; receptacles were hollowed out for food, water, and ammunition, so that neither hunger, thirst,

nor want of powder might oblige the defenders to even temporarily quit their posts; and, finally, bomb-proof cover was provided. If the position was held for any length of time, redoubts were constructed on the most commanding points of the ground, armed with guns, and traced so as to give a flank fire along the front, or a cross fire over the ground in advance of the longer lines of trenches. In the construction of these redoubts again, the care taken to provide cover for the defenders against hostile fire, not only against direct or horizontal fire, but against enfilading, oblique, or curved fire, is ever the most noticeable feature. Where the works were exposed to artillery-fire, where it was to be anticipated that they would be subjected to a prolonged bombardment, or where it was to be expected that guns of a larger calibre than ordinary field-pieces would be brought against them, the parapets were made 18 to 20 feet thick, to secure the defenders behind them from the direct and horizontal fire of the enemy. Huge traverses, of very substantial profile, were constructed across the interior to screen the defenders from oblique and enfilading fire; and, finally, behind these traverses, in rear of the parapets, and sometimes under the counterscarps of the ditches, bomb-proof accommodation, of a very admirable type, was provided. The small amount of damage done to the garrisons of these works by the Russian artillery, even when this latter had been reinforced, as it sometimes was, by siege guns and guns of position, proves how excellently well the precautions taken answered the end in view. As one of many instances which go to prove how effectual was the cover provided, I may mention that it has been stated to me that on one occasion more than 300 shells struck or fell within a single Turkish redoubt, and that only five of its garrison were wounded.

With regard to the supply of tools for the construction of intrenchments, the Turks do not seem to have had any regularly organized system of transport. Sometimes the tools were carried by pack animals, sometimes they were conveyed in waggons or carts, sometimes borne by the men themselves; but some way or other the necessary implements seem to have been always forthcoming when they were wanted. On the other hand, from the Russian side, we hear constant complaints of the want of intrenching tools. Captain Kouropatkine, speaking of the attack on Loftcha, states "the necessity "for rapidly intrenching ourselves in the position we had won, ren- "dered the insufficiency of the intrenching tools of the Russian Army "very apparent. In order to obtain the necessary number, tools had "to be collected from different corps, and when the work was finished "they were not always punctually returned." Several other cases might be cited to show how severely the want of intrenching tools was often felt by the Russians. On one occasion it is stated that a line of men, severely galled by the enemy's fire, were so anxious to cover themselves that they loosened the earth with their bayonets and swords, and endeavoured to pile it up with their drinking cups and hands; and on another occasion a body of men, unable to construct a covering mound of earth, piled up a parapet of corpses, using for the purpose the bodies of friends and foes indiscriminately. But, although the late campaign has thus demonstrated, perhaps in a more striking

manner than any former war, the fact that intrenching tools form almost as necessary a part of the equipment of an army as rifles themselves, it has thrown little or no light upon the way in which these intrenching tools should be conveyed; though it may be noted that Captain Kouropatkine expressed a very decided opinion against giving them to the men themselves to carry. The first thing, he notes, which a man throws away when he becomes distressed or when he wishes to get forward more rapidly, is his intrenching tool; and, therefore, if these are given to the men they are very likely not to be forthcoming when they are wanted.

But, further, the late campaign shows, I would submit, that it is not sufficient merely to have organized arrangements which will ensure that a sufficient supply of intrenching tools shall always be forthcoming. More than that must be done. The men must have been taught, by previous practice, how to use them, the Officers of an army must understand how to intelligently supervise and direct their employment. From remarks made here and there, from hints dropped now and again rather than from any outspoken statements on the subject, it is very evident, or at all events there is strong reason for surmising that on several occasions, even when the Russian soldiers had intrenching tools, they could not use them to advantage. When detachments of Engineers were present to design, direct, and give a lead, the work of intrenching seems to have been performed fairly well by the Russians; but when the ordinary line soldier—in other words the unskilled, untrained workman—was thrown upon his own resources, the work does not seem to have progressed in nearly so satisfactory a manner. General Skobeleff, in some of his reports, speaks of the way in which the work was done when pioneers were present, and Captain Kouropatkine speaks of the assistance rendered by Officers who had passed through the Russian military schools, in a way from which it may be inferred that when these trained Officers and men were absent, the results achieved were not so satisfactory. Neither can this be a matter for surprise. No vast amount of knowledge is required to enable an Officer to design or superintend the construction of such hasty intrenchments and simple field fortifications as may be employed on the field of battle or in the first stages of defence to strengthen a position; but, nevertheless, unless the few simple principles which should govern the construction of such works are fully appreciated, there is, it has been shown by experience, by the experience of the late war among others, a tendency to bungle over what seems to be, and what really is, a very simple task. On the other hand it would be an equal mistake to suppose that committing to memory a mass of details, learning by heart a number of dimensions, will fit an Officer to design or construct hasty intrenchments. In a work on "The Defence "of Outposts," which is now considered old-fashioned, but which nevertheless contains much which may still be read with advantage, it is stated, "If the main conditions to be observed in defending a post "are kept in view, there will be a natural tendency for the minor "details to come right of themselves; provided these, the main prin-"ciples, are at home when wanted, an Officer may safely trust to his

"common sense suggesting more on the spot than memory can "supply."

Passing on now to the last of the deductions I enumerated, it is impossible to attentively study the accounts of the battles and other occurrences of the late war without being struck by the feebleness of the part played by the Russian artillery during the campaign. That the effect produced by artillery fire is due as much to the moral as to the material damage occasioned by it is a very old proposition. In the campaign in Bohemia in 1866, of the total losses suffered by the Austrians, only some 3 per cent. were occasioned by artillery fire; over 90 per cent. of the total losses were caused by the bullets of the needle gun, 4 per cent. by cold steel, and 3 per cent. by artillery fire. And, during the battle of Gravelotte, of the total Prussian loss, whilst over 90 per cent. were caused by bullets, less than 5 per cent. were caused by artillery fire. Nevertheless, it was expected, when the late war began, that the Russian artillery, far superior in the number of its guns to that of its adversary, would influence, in a very decisive way, the operations of the campaign; but, as a matter of fact, it contributed little or nothing to the success achieved. When the second onslaught was made upon the Turkish lines round Plevna, a large number of Russian batteries were in action for several hours against the Turkish position before the infantry advanced to the assault, and prior to the last grand attack more than 300 guns, amongst which were some of unusually large calibre and great power, bombarded the Turkish lines for, I think, four days and five nights before the attack was made, and yet, on both occasions, the attack failed. Again, during the attack on Gorni Dubniak 60 Russian guns concentrated their fire for several hours upon a single Turkish redoubt, armed with four guns only, but did so little execution that several successive attempts to carry the work by storm were subsequently repulsed. That the Turkish works were admirably designed to withstand artillery fire I have already pointed out, but still, the fact that the Russian artillery, on these occasions, achieved nothing worthy of mention must be, in part, ascribed to the faulty manner in which it was handled. The nature of the mistakes committed by those who were responsible for the management of the Russian artillery is, I think, very clearly indicated by Captain von Trotha. In the first place, the batteries present were, as a rule, uniformly distributed along the whole line of battle or front of attack, no attempt being made to keep in hand a number of guns to employ against decisive points. Secondly, the guns opened fire at long ranges, and always directly against the enemy's works, no attempt being made to sweep his lines with oblique or enfilade fire. And, thirdly, it was but seldom the Russian batteries advanced as the infantry moved forward, and consequently the fire of the Russian artillery was very frequently masked immediately the infantry began to advance.

With regard to this last criticism it may be noted that on the few occasions on which Russian batteries did advance into the zone of the musketry fire of the defenders they were generally obliged to fall back, on account of the losses they suffered in men and horses. This fact is

noticed by Captain von Trotha; but none the less does he insist upon the necessity of batteries pushing forward with an attack, in order that they may be at hand in readiness to seize, by skilful and daring manœuvring if necessary, any opportunity which may present itself of co-operating in the attack. That in so doing they may, and probably will, suffer loss is admitted; but answering in anticipation this objection which may be urged to pushing forward guns into the fore-front of battle, Captain von Trotha argues, with much reason, that a single battery which, from an advanced position, has been able to fire with decisive effect for five minutes before being put out of action or being obliged to retire, will have contributed more towards the general success than ten batteries, which from a retired position have kept up during the whole day a well-aimed, it may be, but nevertheless ineffective fire.

Finally, the small amount of damage done to the Turkish works by the Russian artillery would seem to indicate the necessity of supplementing the present field artillery of an army with guns of larger calibre and of greater power. At 2,500 yards, the 4-pounders of the Russian artillery were unable to make any impression at all upon the Turkish works; they did absolutely no damage whatsoever to the intrenchments of the defenders; and even the 9-pounders did very little damage. That a recognition of the necessity of thus adding to the artillery of an army guns more powerful than those in present use was forced upon the Russian leaders by the events of the late campaign may, I think, be inferred from the fact that the largest of the two classes of field-pieces which are at the present time being manufactured for the re-armament of the Russian artillery has a calibre of 10·7 centimetres, or 4·1 inches, a calibre, I believe, larger than that of any gun in use in any European Army, and throws a shell weighing 28 lbs.

As I have now reached the limit of my time, I must conclude the few remarks I have ventured to address to you, and in which I have only attempted to indicate in the baldest manner a few of what seem to me to be the most important tactical lessons of the late war.

Captain TROTTER, R.E.: Perhaps I may be permitted to say a few words, as I had the honour of serving under Sir Arnold Kemball in Asia Minor throughout the campaign. There are one or two points I noted in the course of the lecture which I should like to allude to. The lecturer said that, if there were two lines of intrenchments, he thought it practicable that the front line might be firing upon the enemy's skirmishers while the rear line was firing upon the supports or reserves. I think that would hardly be practicable. I think both lines would be much more inclined to fire upon the enemy's skirmishers (who would probably be the only people they could see), than to think of firing upon the supports or reserves. Then another point about the ammunition. At the first battle at which Mukhtar Pasha was victorious, the men were provided each with 150 rounds of ammunition; they carried 50 rounds in their pouches, and the remaining 100 rounds, some, like the Circassians, in pockets made on the breasts of their tunics, and others in their havresacks, mixed with their biscuits, or in any other place where they could find room. In addition to what was carried by the soldiers themselves, there were 30 ponies for each battalion (the very arrangement the lecturer suggested as being the best possible), each carrying 2,000 rounds, and there is no doubt it was a very successful arrangement. I saw on some occasions the ponies being actually taken up to the lines of skirmishers to provide them with fresh ammunition. An objectionable point

was, that the ammunition was all carried in the original boxes which came from America, and these had to be broken open and the cartridges distributed under a heavy fire, not a very easy thing to be done. No doubt that might be improved upon. As to artillery, it has been said that the Russian gunners throughout the war fired at very long ranges. There is no doubt that, in Asia Minor, up to the very end of the war, that was invariably the case; but in the fatal battle of Alaja Tagh, I understand that the Russians brought their guns up to within 1,500 yards of the Turks. It was the first time they had done so; and it gave rise to a report all over the Turkish Army that the Russians had been supplied with Prussian artillery Officers. I believe the real fact was, that the guns belonged to the division of Grenadiers from Moscow, which had just arrived at the seat of war, and whose Officers were better educated and more efficient than those of the other divisions which had previously been taking part in the war. Their guns were brought up to within about 1,500 yards of the Turkish lines, and fired with tremendous effect. The same thing happened at the battle of Deveh Boyun in front of Erzeroum; the guns were brought up very much closer than I had ever seen before,[1] and were very effective, especially in the centre, where the Turkish troops wavered and retired, without awaiting the attack of the Russian infantry. As regards the loss caused by the artillery, I made an estimate that, at Kars, the Russians fired 150 shells for every casualty that occurred. While I was with Ismail Pasha's force in the Erivan district, on one occasion, I saw 60 or 70 shells burst in the immediate vicinity of a Turkish field battery. I went down to ascertain the number of casualties, and I found there had only been one man touched.

Admiral SELWYN: I think, if I had no other observation to make, I should be very much inclined to get up and compliment the lecturer for one of the clearest and most instructive lectures that has ever been given at this Institution. Not only has it been delivered in a manner which deserves the highest praise, but the points which have been touched are those which must receive the most close attention in our Army in a very short time. There is one change which is now on the point of being made with the cartridge. We are now going at last, I believe, to have a solid cartridge case—at least, a solid drawn cartridge case—and I hope no mistake will be made about that, and that the words which have been spoken here to-day may find their echo in the breasts of those who have to decide the matter; since the cartridge which might be made is 10 pounds in the 100 lighter than the cartridge that is now made. That is a very important point with reference to how many cartridges a man can carry; and due attention, I consider, has not in our decisions been paid yet to the fact that the cartridge is really the first thing to consider in every breech-loading arm; that whereas you may use almost any form of rifling, you cannot carry the quantity of ammunition that you ought to carry if you do not make the cartridge-case as simple as possible in its construction. It ought to be incapable of galvanic action between its component parts. It ought to be able to stand any amount of rust or damage to the interior of the chamber without being thereby incapacitated from withdrawal, and, most of all, it ought to be the very lightest cartridge-case possible, which will produce the effect we want from it. I was in Turkey during the whole of last year, and I noticed particularly that the supply of cartridges given to the Turks was both highly efficient in itself, and provided for much larger expenditure than had ever been thought probable in any other army before. The Turks were also our masters in the art of intrenching. Vauban confesses he learned every lesson he ever knew from the Turkish system of intrenchments, and they have not yet ceased to employ their spades as thoroughly well as they did in Vauban's days. Osman Pasha, who was the unaided engineer at Plevna, showed that the military school at Constantinople can turn out equally good men for all practical purposes with any school in the whole of Europe. They have a thorough knowledge of the use of the spade by a whole army, such as, I am sorry to say, is not yet thought necessary to be given to all our soldiers, and they carried, wherever they went, sufficient intrenching tools for that purpose. There is one essential thing to be noted in the general carrying of an intrenching tool by each soldier, viz., that it

[1] I was not present at the battle of Alaja Tagh.

must not increase in any manner the weights he now carries. This can only be done by economising some of the useless weight which soldiers now carry. If a rifle is made up of 4 lbs. of wood in the stock, and 4 lbs. of steel or iron in the barrel, there are nearly four useless pounds for all practicable purposes there, and if that useless weight is partly replaced by a useful intrenching tool, under such circumstances it is very unlikely that the soldier will ever throw that intrenching tool away. The ordinary intrenching tool is an incumbrance to him, and he is very likely to throw it away: for that reason, I never have been an advocate for the complicated and curious weapons which have been from time to time introduced under the name of intrenching tools. I think this can be done, and ought to be done, during peace, that we may be prepared for war; and I believe, however we may have been relieved at the present moment from the immediate fear of a war, such a relief really means nothing else than the extension of the great war of the future, which every one who studies European politics must see is coming.

Mr. C. B. NORMAN: There is one point I should venture to remark upon, namely, the carrying of intrenching tools. Certainly the Turks had no very good method of carrying them. They were sometimes carried on the back of pack animals, and sometimes were close forward up to the front when they were wanted. A system of carrying these tools was instituted in India, which certainly worked very well. They were carried in wooden frames, very similar to the crates in which china is packed in England, with lattice-work bars. Each camel was able to carry fifty pickaxes and fifty shovels in this way with the handle running vertically down, and the bar of the pickaxe over the top. By this means the intrenching tools were always kept up with the battalions. The camel is of course a very awkward creature, especially under fire, but I think smaller crates were used on more than one occasion which were put on the backs of mules, and certainly they would be a very great advantage to any enemy operating in a mountainous country as in the Balkans or in Armenia, if a certain number of mules, say two to each company, could be spared to carry intrenching tools, just as I believe they will be spared for the purpose of carrying ammunition.

As to the Russian artillery fire, I cannot help thinking it was greatly owing to the want of instruction on the part of the Officers that so little damage was done. I remember being once with Sir Arnold Kemball, and seeing shell after shell bursting absolutely underneath the gun when the crews were endeavouring to drag it out of action. On one occasion we saw three men on the ground, and made up our minds that they must be knocked over, but after looking about they jumped up and dragged the gun out of action. I do not think there was a single man touched in that battery, but that was entirely owing to the percussion fuze failing to act properly. Perhaps that is a lesson that may be lost upon us; percussion fuses are certainly nothing like time fuzes.

The CHAIRMAN: I consider myself very fortunate to have been invited to preside on this occasion, to hear the views of Captain Needham. I think the diligence with which he has mastered his details, and the clearness with which he has expressed his conclusions, have resulted in a very interesting lecture, entitling him to the best thanks of the meeting. His conclusions are quite in accordance with my experience in Armenia. It is scarcely fair to compare European troops, regularly disciplined, with raw Turkish levies who were suddenly called into the field in large bodies without the slightest organization, and who had had no opportunity whatever of ball practice. It is not surprising, therefore, that in long-range fire they should have wasted an enormous quantity of ammunition altogether out of proportion to the effect produced, but at whatever cost the ammunition was forthcoming, and the effect produced was generally decisive. As regards the supply of ammunition, and the mode of providing intrenching tools, the Turks were no doubt dependent on rule of thumb arrangements, but it is a fact nevertheless that their ammunition, except at the first battle, was always ready when required, and the intrenching tools were at hand. We hear more, I think, of shortcomings in these respects in the better organized and well-disciplined Russian Army. Be this as it may, however, it is certainly marvellous that the Turks should have effected so much in spite of the defects of organization. I need not detain the meeting with any further remarks before proposing a vote of thanks to Captain Needham, except to notice one

point which I think important—I mean the mode of carrying ammunition by the soldier, as improvised by the Turks, which proved very efficient. Captain Trotter has already referred to it. The pouches being insufficient, Mukhtar Pasha encouraged his men to sew slips of cloth on the breasts of their coats with pleats, in the Circassian fashion, to contain cartridges, also to provide themselves with broad belts of cloth or leather similarly fitted. By this means he succeeded in distributing the weight over the body, affording also some sort of protection against the enemy's fire, and enabling the soldier to carry from 100 to 150 rounds of ammunition or more with greater ease and advantage than when tumbled in bulk into his havresack, and mixed up with its contents.

LECTURE.

Friday, 5th July, 1878.

General Sir WILLIAM J. CODRINGTON, G.C.B., &c., Vice-President, in the Chair.

ON THE ADOPTION OF THE NAVAL AND MILITARY SYSTEMS OF EUROPE BY CHINA AND JAPAN.

By Captain Cyprian G. Bridge, R.N.

My first duty this afternoon is to explain, and, if necessary, apologise for coming forward as a lecturer in this theatre a second time in the course of one annual session. I hope my audience will accept my assurance that my appearance here to-day is due only to an invitation, more than once repeated. The subject to be brought before you is not of my own selection, but was proposed to me in the invitation mentioned, and no one can be more fully persuaded than I am of my inability to handle it effectively. To do it perfect justice, it should be treated by a competent scholar of the Chinese and Japanese languages, by a student of the abundant military literature of those tongues, and by a person conversant with the internal and foreign politics of the two countries. To not one of these qualifications do I make the smallest pretence. I have, indeed, spent some time in both China and Japan, and I have also had some opportunities of witnessing the progress they have made in their adoption of the naval and military systems of the West, and I have diligently searched through literally scores of volumes for notices of the condition of their armaments at various periods of their history, as recorded by foreign observers; but beyond this I have no claim to be considered in any way an authority in the matter. The subject—though, as I have said, not one of my own choosing—is an important and interesting one, and I regret, for many reasons, that it has not come to be taken up by one of the many highly competent gentlemen whose names are well known in the far East, and who are now in this country.

An inquiry into any of the institutions of either China or Japan is likely to possess an interest of a highly peculiar nature, and depending on different causes in the case of either nation. The astonishing antiquity of the Chinese Empire must render extremely interesting an

examination of any department of its polity. A thousand years before the half-mythical period when the rape of Helen was avenged by the siege and destruction of Troy, China had attained a considerable national position, and was in possession of a settled government. Within the space of time that has since elapsed, empires have risen and fallen, others have been erected on their ruins, to fall in their turn, and great revolutions of race, in politics, and in religion have changed the aspect of the world elsewhere; but with her, language, institutions, and national character have maintained a remarkable, unquiet indeed occasionally, but still unbroken continuity. As has been eloquently said of her, she is "a venerable structure, the last remains "of the fabric of empire reared by the hands of the men of olden "time." The antiquity of Japan, respectable as it is, seems insignificant by the side of that of her neighbour nation; but there is something about her so attractive, the scenery of the country is so beautiful, the climate so lovely, the history so romantic, and the manners of the people so polished and engaging, that an investigation of any matter concerning her exercises a fascination over the minds of all who have enjoyed the advantage of visiting her shores, or to whom descriptive accounts of her are familiar. Both nations, for many generations, evinced a strong repugnance to submit to foreign instruction, and, in the case of one—China—that repugnance has been overcome as yet only as regards advance in the path of naval and military progress, which—regret it as we may—few here will be disposed to deny is, in our own time at least, an important branch of high statecraft; whilst, in the case of Japan, movement along this path is but part of a wholesale change of system and imitation of the institutions existing in the western world.

To simplify the method of the inquiry which I have been asked to undertake, it will be better to examine the advancement of each country separately, in the improvement of its naval and military system under the influence of foreign instruction. For each, then, it will be well to, first, give an account of the condition of its armaments at the epoch at which Europeans first began to be intimately acquainted with the concerns of the far Asiatic East. Secondly, to call attention to the progress made by them, as noted by foreign observers. Thirdly, to ascertain their condition during our several conflicts with them. And, lastly, to glance at the progress they have made up till now, and the position in which either country stands at present.

Our earliest intimate knowledge of China we owe to the accounts sent home by the Roman Catholic missionaries. To them and to their contemporaries that empire seemed, and rightly seemed, to have attained a marvellous pitch of culture and enlightenment. At the present day, there still exist in many parts of China obvious traces of good order and refinement, to which the Europe of Charles V or Elizabeth must have failed utterly to find a parallel. Gigantic public works, of pomp or utility, an ancient literature in the native tongue, an active and wide-spread commerce, remarkable mechanical ingenuity and skill in the useful and decorative arts, as well as a highly organized system of

government, and an orderly and pacific population, formed a combination to be looked for in vain in the kingdoms of the West. Europe, torn by conflicts waged in the name of religion, or because of the ambition of dynasties, could not claim great superiority over the newly visited empire, even in the matter of warlike science. Certain weapons she indeed possessed, such as cannon and portable firearms, rude and imperfect as both these were, which China, we may concede, had not learned to use. But in organization and discipline, the eastern country was, and continued to be for many years, far in advance of even the foremost European military states. The Jesuit Navarrete, writing in the seventeenth century, tells us that, having had personal experience of a Chinese Army on the march, he would far rather have to traverse two Chinese Armies than one of Spaniards. In his celebrated work, the "Histoire Philosophique et Politique," &c., published a hundred years ago, the Abbé Raynal—summing up the accounts of Chinese polity due to the diligence of the missionary visitors—noted the absence of a warlike spirit amongst the Chinese, but expressly asserted that its non-existence was not incompatible with a self-devoting courage. Many incidents of our own wars with them show that, if they did not know how to fight, they at least knew how to fall courageously; and, in the course of the long struggle, now apparently approaching its issue in Kashgaria, the devotion of many commanders of beleaguered Chinese garrisons—who preferred self-destruction to surrender—has rarely been surpassed, even among the warrior races of the western world; so that the submission to the restraints of military discipline, which rendered a Chinese force so orderly, and therein so different from a contemporary European one, was not due to any pusillanimity on the part of its members. The unwarlike spirit of the nation showed itself in a horror of war for war's sake, and in an enlightened preference for the arts of peace over that military glory which is but too often accompanied by bloodshed, rapine, and pestilence. "Contumelious, "beastly, madbrained war," as Shakspear stigmatises it, was to be dreaded as interfering with the prosperity of the people, not because they were afraid to risk their lives in it. Unwarlike as it was, the nation was not unmilitary. Several military maxims, long current in the country, have been made known to us. "An Army is intended "to defend the people, and not molest them," must have sounded strange in the ears of Europeans, who might have had personal experience of the conduct of Tilly's and Mansfield's troopers. "The Army "may be a hundred years unemployed, but not a single day un-"prepared," summarised the whole theory of a standing army, ages before our "bluff King Hal" had called his Yeomen of the Guard into existence, and was probably not unthought of at Berlin, between La Belle Alliance and Koeniggratz.

So in the government of the Empire, under both its native sovereigns and the present intrusive reigning house, a separate branch of the administration was charged with the duty of superintending the defensive forces as is the case in the countries of modern Europe and in America. One of the boards into which the supreme Government was divided, was and is the *Ping-pu*, or Board of War; War Office, as

we may term it. Under it was the superior military tribunal, or *Yong-Ching-pu*, which seems to have exercised the functions of the head-quarter staff, and was the vehicle for the transmission of the orders of the supreme authority, with whom the decision on great questions of military policy lay, to the executive departments or *bureaux*, of which there were five seated at the capital. Since the Manchu dynasty has usurped the throne there have been in reality two distinct Chinese Armies; one the Banner force, and the other the *Luh-Ying*, or troops of the Green Standard. On the organization and distribution of these bodies of men a series of admirable essays were written more than twenty years ago by Her Majesty's present distinguished representative at the Court of Peking, Sir Thomas Wade. They are to be found in the *Chinese Repository* for 1852, and I strongly recommend the perusal of the exhaustive account of the Chinese Army contained in them to any person interested in the subject. The qualifications of their eminent author, as soldier, sinologue, and diplomatist, give to them an authority which no other writings on the same theme can well lay claim to. The Banner force comprises both a standing army and a body of household troops. It may be roughly, but with sufficient accuracy, divided into palace satellites, Imperial Guard, and garrisons for the capital and several of the chief cities of the Empire. It is divided into eight corps, or banners, and in its ranks are Mongols, Manchus, and Han-kiun, or descendants of those Chinese who forsook the native Ming dynasty at the invasion and went over to the cause of the usurper. These last are spoken of in the accounts of the missionaries as "Tartarised Chinese." Each corps contains archers, musketeers, and artillery, and there is also a large body of cavalry belonging to it. Its nominal strength has been roughly estimated at from 100,000 to 130,000 men; all the males of Tartar families dwelling in or near the capital being in a sense enrolled in it. It is, however, very doubtful if it could turn out in anything like that number. This *corps d'elite* has yielded, in its organization, drill, and equipment, less to the influence of foreign ideas than the other portions of the Chinese Army, and the long-bow and the cross-bow are still its favourite arms. I have myself seen considerable bodies armed with those antiquated weapons going to and returning from the practice ground outside the walls of Peking; where it is no uncommon sight also to meet with some dashing young Officer of the Guards driving out to the butts in a springless cart, the ordinary street-cab of Peking, from under the arched covering of which peep out the end of a bow and a quiver well filled with arrows.

The troops of the Green Standard are almost entirely Chinese. A few Officers above the rank of subaltern are Manchus. This force has been, at different times, variously estimated at from 600,000 to 800,000 men. The numbers on the lists probably do not fall much short of the larger total; but many of them only turn out for duty when actually required. "It is," says Sir Thomas Wade, "rather an immense "constabulary than a fighting Army." Differing from the Banner force in one important respect it is under the orders of the provincial mandarins. The Government of China is in great measure local

and provincial in its character; each province having separate revenues, a separate army, and—if on the sea-board or traversed by great rivers—a separate naval force. To this we may with all appearance of probability attribute that extraordinary want of uniformity in organization and equipment which is to be observed in different bodies of Chinese troops and different squadrons of armed vassals. Within the course of a short journey, bows and arrows, breech-loading rifles, spears, sword bayonets, shields, Krupp guns, matchlocks, and antique smooth-bores may all be seen in use both on shore and afloat. And I have noticed, not once but often, man-of-war junks and steam gunboats flying the dragon flag lying at the same anchorage. A progressive Governor-General, like the eminent Li-Hung-Chang and his reputed rival Tso-Tsung-Tang, establishes arsenals for the construction of modern weapons and ships of European model, whilst a conservative contemporary adheres to the fashions of his ancestors; both being little hampered by orders from the Central Government. The troops of the Green Standard are, or were, divided in 1,202 *ying* or battalions, and they were distributed through forty-one different stations.

Recruiting for both branches of the Army, we learn, is not attended with many difficulties. The Banner-men are hereditary soldiers; and the ranks of the Green Standard are filled by volunteers who, as one account informs us, are often so anxious to enlist that they give presents to the mandarins to allow them to enrol themselves. When not on duty they are permitted to work at their trades, and thus earn an addition to their regular pay. The Officers often, perhaps generally, rise from the ranks; but the system of competitive examinations is in force for the military, as well as for the civil service of the Empire. The examination, unlike that in some enlightened countries which have copied it with so much self-congratulation, is not simply a literary one. In China, the original home of competitive examinations, where cramping the feet of ladies and the intellects of those who desire to serve their country are both in fashion, they have not gone quite so far as to make a rule that that which is a good test for selecting pupil-teachers is by itself an equally good one for selecting naval and military Officers. A part of the examination is designed to test proficiency in riding and martial exercises. As the country makes farther "pro-"gress in the art of war," and comes more under the influence of western enlightenment, we may hope to see the scholastic test alone retained as evidence of fitness for the least scholastic of professions. But they are not an illogical people, and when they do this they will probably also make superior proficiency in knotting and splicing an essential qualification for a college tutorship. The examinations are held periodically, at different head-quarters. What in Western Europe is called "interest" is nevertheless not unknown in China, and Sir Thomas Wade states that the claims of parents of hereditary rank for appointments are admitted.

The arms of the troops when we first learn much concerning them were swords and lances, the bow and arrow, the cross-bow and bolt; and we are expressly told there were "few musketeers." The match-

lock is said to have been introduced into the Chinese Army under the Ming Emperors early in the sixteenth century. It was probably not inferior to that in use in Western Armies at the time. The sword was peculiar; it really consisted of two in the same case or scabbard, one of which was held in each hand, and was manœuvred in an extraordinary manner by whirling the arms, the soldier all the time going through a sort of acrobatic performance of leaps and contortions of body. This quaint sword-practice is still in existence. Captain Colomb may remember my accompanying him one day, first to witness some Chinese soldiers firing Remington breech-loaders at a target, in accordance with the Hythe regulations, and then to see some of their comrades wildly flourishing their two swords to the sound of a *tom-tom*; an instance of the anomalous condition of things military in China of which mention has been already made.

It was long believed in Europe that the Chinese used cannon ages before it was known amongst us. I have seen statements to that effect in several works which I have consulted. Marco Polo is credited with the assertion that, as far back as the thirteenth century, it was used, if not by them, at least against them. I confess I cannot so construe the meaning of any passage in the record of his travels. Sir John Barrow says that in their old works on tactics, mention is made of gunpowder for use in war only as a means to annoy an enemy by springing mines, and that they contain no allusion to cannon. On the whole, the balance of evidence is in favour of the view that they learnt the use of cannon from foreigners. In 1621, three pieces were presented to the reigning Emperor of the then existing Ming dynasty by the city of Macao. So ignorant of the use of the weapon are the Chinese of the time said to have been, that, we are told, gunners had to be sent with the guns to teach them how to work them.

The story of the first casting of guns in China is curious. Two missionaries, Ricci and, after him, Adam Schall, had attained great influence at court as mathematicians and men of science. The latter, between 1630 and 1640, A.D., was appointed head of the Astronomical Board, under whose direction was carried on the important duty of regulating the calendar, and his scientific qualifications probably seemed unbounded to the Emperor and his courtiers. The three guns from Macao had done good service against the Tartars; and during an invasion of the country by them, it was suggested that the fortified towns should be armed with similar weapons. Schall was asked, as though casually, if he knew anything of the art of cannon-founding; and, replying that he was not wholly ignorant of the process, was directed by Imperial order to begin at once and establish a foundry. In spite of his protests of insufficient ability, he was compelled to assume the superintendence of the workmen, and he succeeded in casting a large number in the year 1636. Father Verbeist performed the same office for the Manchu usurpers, and added several hundred pieces to those cast by his predecessor. Strange as it may seem, this apparently well-authenticated story does not altogether dispose of the Chinese claim to have invented cannon themselves. Lieutenant Forbes, R.N., writing in 1848, tells us that he saw at Woosung,

shortly after our forces had destroyed the batteries there, guns lying about on which was the date answering to 1632, that is, four years earlier than Schall's establishment of the foundry. Captain Arthur Cunynghame, aide-de-camp to Lord Saltoun in our first war with China, relates, in a book published in 1844, that he had seen captured guns which were composed of plates of iron bound together by hoops of the same material, and in one case by ropes of silk; which latter may recall to some here present the ancient gun in the armoury of the Palace at Malta—a metal tube bound round with rope.[1] This system of construction had become obsolete for generations before the missionaries began to cast guns for the Emperors; and it is quite inconceivable that, having adopted the more improved plan, a return should have been made to the older and long disused method. The true explanation of this apparent contradiction is probably to be looked for in the provincial organization of the empire before alluded to. Some local army may have been provided with cannon by its chiefs quite without the knowledge of the Central Government. For us, engaged in our present examination, the true significance of the story of Schall's and Verbeist's labours, and of the introduction of matchlocks is, that we learn from it that, even as far back as the sixteenth and seventeenth centuries, the Chinese, however averse to the introduction of foreign inventions, showed no repugnance to learn from strangers in the art of war. Their history since proves the same to be the case, without exception.

Mention has already been made of the comparative superiority of China in the arts, when compared with Europe, at the date of our first extended intercourse with her. Till very recently, if not quite till now, while Europe has been making enormous advances, she has remained stationary. Three centuries ago, perhaps even long before, she attained the summit of her culture. Further west, the most remarkable progress in the art of war has been made within our own time; but there was movement forward throughout the whole period. The fairly good discipline of the Chinese troops at the early date spoken of, deteriorated, or at all events did not progress, within the period that has since elapsed. A tactical system, exact in the manœuvres composing it, and not unsuited for use against the only enemies which threatened the borders of the Empire, as far as we can see, also, but little more pedantic and little less effective than that which Europe learnt from the great Gustavus, was noted by our missionary authorities as being in force in the Chinese Army quite as soon as the "Swedish battaile" was recognised as an excellent formation for European soldiers. In these two particulars, therefore, the West could teach China little, but of what it could, she was a not too repellent learner; so that her not having taken lessons from us in such matters till within the last few years, is not by any means evidence that her traditional conservatism was proof against our instruction.

During our first war with the Chinese, in 1841-2, their Army and Navy was much in the condition in which it was described to us as

[1] There is a "silk gun" in the Museum of the Institution.—Ed.

being nearly two centuries before. The Navy, like the Army, under the supreme direction of the Board of War, was even more distinctly provincial in its character than the land service. There was nothing answering to the Banner force in the considerable flotilla which guarded the coast, and did police duty on the internal waters of the Empire. The number of seamen belonging to it is generally put at about 30,000. The Officers occupied similar positions and bore the same titular designations in the different ranks as did those of the Army. The combatant Officers were rarely or never sailors. The navigation of each vessel was left to a sailing master and his assistants, as was long the case in more important navies elsewhere. The latest English writer on China, Archdeacon Gray, gives an account of the Navy of China which presents us, probably, with an exact picture of what it was for ages, and what great part of it still continues to be. The art of shipbuilding had a long antiquity in China. The ocean-going war-junks were often of great size, and, being exceedingly handy, not bad sailers, and divided into water-tight compartments, were probably not at all inferior to the barques which carried Vasco de Gama or Magellan on their adventurous voyages. But whilst Europe had been advancing to the "Alexandra," or at least to the "Duke of Wellington," the Chinese shipbuilder's craft had remained stationary. The ships had high bulwarks and pentagonal port-holes. Guns were mounted solely on the upper deck, frequently on immovable carriages, and the crews had but the slenderest knowledge of gunnery. "The ocean-going "war-junks do not," says the Archdeacon, "form the bulk of the "Imperial Navy." There are large numbers of light-draught gunboats for lake and river service. Many of these are similar to the galleys of the sixteenth and seventeenth centuries in the Mediterranean, and can be propelled by oars at a great speed. As a specimen of a provincial naval force our author gives us a description of that of the province of Kwang-tung. There are 161 vessels always in commission. These are divided into three classes, viz., the first of 10 junks, the second of 115, and the third of 36. The cost of each of the first division is about 1,300*l*., of each of the second about 1,100*l*., and of each of the third about 800*l*. They are classed for nine years only, and are not allowed to go into dock until they have been three years in commission. At the end of that time the provincial authorities are empowered by the Board at Peking to expend a certain fixed sum, according to the class to which she belongs, on each vessel for repairs. After a second three years' commission, they are again docked for repairs, the amount of money allowed for the purpose being definitely fixed, as in the previous case. After a third commission they are considered as no longer fit for the service. Before any vessel can go into dock for repairs the mandarin under whose orders she is placed applies by letter to the Governor-General or Governor of the province for authority to lay her up, certifying that she has completed her three years' commission, and is in need of repair. The Governor-General, or Governor, in reply gives the permission asked for, and the expense is defrayed by the Salt Commissioner. An annual allowance is made to each vessel for wear and tear of sails, ropes, &c. The Chinese

evince no small aptitude as seamen, and I have more than once seen a squadron of war-junks, sailing in company, manœuvred in a very creditable manner, whilst the appearance of each particular vessel left little to be desired.

The art of fortification amongst the Chinese until we made war on them in 1841 was much behind that of Europe, though perhaps quite equal to anything they had to apprehend from any neighbouring enemy. They were credited by our Officers even then with the merit of being able to select good positions for their works. Long lines of parapets, thinly built of masonry, or even mud, and cut by innumerable embrasures, through which were generally pointed guns, usually of very small calibre, constituted their chief defences. These of course offered but a poor resistance when brought under the fire of the 32-pounders of our ships. The fortifications of inland towns were still more primitive. As a rule near the coast, suburbs have so grown up round the large towns and cities, that the walls are not easily distinguishable. But on my way to the Great Wall at Nankow the autumn before last I had to pass several towns, where, if there was any suburb at all, it was a mere cluster of houses outside a principal gate. In all the same trace was pretty accurately observed. A rectangular rampart crowned by a thin wall of masonry enclosed the place. Towers, as in mediæval Europe, stood at the angles and at intervals on each face. The gates were surmounted by a blockhouse, pierced with innumerable ports and loopholes; and an interior retrenchment formed a sort of lunette at the entrance. Outworks and advanced works were never seen, except occasionally small detached square towers on eminences and at the mouths of passes through mountains. In our earlier attacks on the Bogue forts there were not wanting evidences that even in fortification the Chinese had consented to learn something from strangers. As a matter of fact, the opportunities which the former possessed of observing foreign systems of defensive works erected in their neighbourhood by Portuguese, Dutch, or Spaniards were not such as to give them much cause to disparage their own. The tiny bastions of masonry and *guérite* surmounted salients of the pre-Vauban period, which are in their ruins so familiar to visitors to the transmarine possessions of the maritime powers of the sixteenth century, were superior indeed to the continuous lines and square towers of a Chinese fortress, but not so obviously so as to make their supersession of the latter at once seem necessary.

When we fought with China in 1840-2 little real progress seems to have been made since the seventeenth century. The batteries we found opposed to us were armed with guns of small calibre, the parapets had little resisting power, and the matchlock, loaded with loose charges of powder, was still the chief portable firearm. Our own weapons, it is true, were—though much more efficient—not very formidable. Smooth-bore guns composed our entire ship and field artillery. Our infantry still carried the "Brown Bess" musket, and the flint lock was hardly completely superseded by the percussion cap. The tactics of our own forces were still far inferior to what we have since made them, but our enemy's were much behind them. Lieutenant Forbes mentions that in

some cases every Chinese soldier carried a lantern, and thus afforded an excellent mark at night. The matchlock frequently led to horrible destruction of wounded men, as their cotton clothes were in many instances ignited by the lighted match. Sometimes the Chinese Officers showed a certain ingenuity in the use and arrangement of explosives. An old French writer two centuries before had noted that "their valour consists in policy and stratagems of war;" and a still earlier Portuguese navigator had, whilst acknowledging their passive courage, observed that "they always use strange policies and all kinds "of fireworks, both by sea and land." A statement, the truth of which we have had some opportunity of testing in junk actions and on the rivers.

Our first war, however, taught them some lessons, which they aptly learnt. Captain Cunynghame wrote at the date above mentioned that they had "already launched a fine frigate built by an American." Lieutenant Forbes recorded his opinion that "a few years of active "hostilities would teach them the art of war, and enable them on land "to defy invasion by any Power in Europe." And even at the time at which he was writing the Chinese had "two or three English-shaped "ships." In a periodical called the *Friend of China* it was stated five-and-thirty years ago that "the Chinese are building ships on European "models for defensive objects; that they are constructing their forts "on better principles; and that they have foreigners in their pay, "from whose instruction they hope to benefit in the practice of "gunnery." Internal disorders, especially the great Tai-ping rebellion, prevented much progress being made in the path on which they had entered, but our experience in front of the Taku forts in 1859 proved that their knowledge of both gunnery and fortification was different to what it had been sixteen or seventeen years before.

It was really after the close of our last war with them that the great advance began to be made. Assistance was rendered by both France and England to China in the training of troops, who should be employed in putting down the still unsuppressed insurrection of the Tai-pings. The aptitude of the soldiers then trained was amply demonstrated by the force led by our countryman Colonel Gordon, which deserved and obtained the appellation of "the ever-victorious army." When this work had been accomplished, that of establishing arsenals and dockyards on the western system began. From an interesting paper in the *Cornhill Magazine* for December, 1872, I draw the following particulars:

In 1861 Dr. Macartney, who had been serving as a medical Officer in Her Majesty's 99th Regiment, offered his services to Li Hung Chang, at that time Governor of the province in which the city of Shanghai is situated, as instructor in the chemical processes required in the manufacture of explosives for military purposes. They were accepted; and a small manufactory of rockets was begun, and a small number of mortars were cast. When the rebels were driven out of Nanking in 1864 by the Imperial forces the works were removed to it, and Dr. Macartney was placed at the head of what is now the oldest Chinese arsenal on the new plan, and an important factory of heavy

guns. Several others have since arisen, viz., at Foochow, Shanghai, and Tientsin. The two former are rather naval yards than arsenals, though the ordinary work of a great factory of arms is carried on at both.

The history of the Foochow establishment is very remarkable. In a former number of the Journal of this Institution (vol. xx, No. 88) will be found an account of it and of the work done at it, which I translated from a pamphlet by its founder and chief, Lieutenant Giquel of the French Navy, whom I had the pleasure of meeting whilst serving in China. Time would fail were I to attempt to recount it now in detail; and it need only be stated that in the course of seven years from the date at which the preparation of a site was begun, not only was a great naval yard, forty acres in extent, with dry docks, building slips, steam factory, workshops for making delicate and scientific instruments, and a school and training ship for young Officers formed, but a large number of very efficient ships-of-war were built, equipped, and put to sea. I doubt if such an amount of work has ever been executed under such difficulties in so short a time in any country in the world.

In 1865, after Dr. Macartney's departure, a small establishment for the fabrication of rifled small arms and shells was set on foot at Shanghai under an American superintendent. Two years later a more extensive one was erected at a short distance from the native city. In 1876 I visited it in company with Captain Colomb. There were dry docks, slips, cannon foundries, cartridge-making factories, and a large shop for the production of Remington breech-loaders, which could be turned out at the rate of 500 a week, and there was also a large number of breech-loading guns and Gatlings, and a quantity of torpedo stores. An enormous plant of machinery had recently been received from England, and was in course of erection. Two steam frigates, one of which was in commission, and which I was allowed to inspect, had already been built and engined there: and a small ironclad gunboat for river service was being fitted at one of the jetties. It was in contemplation to establish a series of workshops for the manufacture of armour plates. A chemical laboratory for the fabrication of fuzes and electric firing apparatus was already in existence. The frigate was a handsome craft armed with Krupp breech-loaders, and from Captain to boy every soul belonging to her was a native Chinese. She is said to have great speed. No fault could be found with her neatness or cleanliness.

At Tientsin I visited a cartridge factory, appropriately established on the site of the temple in which Lord Elgin signed the treaty of peace. There is also a powder factory at the same place, but some distance from the cartridge establishment. At Canton negotiations were in progress for the purchase of the Whampoa dry docks, some dozen miles below the city, from their proprietors, an English company, for the purpose of converting them into a naval dockyard; but I have not heard with what result.[1] The ships built and equipped in the

[1] Within the last few days an apparently well-founded report, that an arsenal and depôt for military stores is to be at once established at Peking, has reached London. (June 13th, 1878.)

country, together with those purchased abroad, now amount to a respectable total; and most, if not all of them, are of the most modern construction, have arms with the latest improvements on board, and are respectable performers under steam. Two gunboats of the "Staunch" class on Mr. Rendel's plan had arrived in China before I left; and a year ago I passed two others in the Red Sea on their way out, and it has been known for some time that they had reached their destination.

At Canton, Foochow, Shanghai, Chefoo, and Tientsin, and I believe at several other places, there are bodies of troops armed and drilled as those of the West. At some garrisons the words of command are given in English. I have no more than a rough estimate of their numbers, but I suspect they do not fall short of 20,000 men.[1] The suppression of the Yunnan insurection some four years ago was, in a measure, owing to the superior armament of the Imperial soldiers, to whom European weapons had been taken by foreign speculators. The Chinese Generals, however, have not been content with availing themselves solely of the advantages due to the adoption of Western arms and tactical systems; they have recently imitated the most memorable strategic feats of European commanders. In the *Spectator* newspaper of April 13th there is an interesting account of the Chinese re-conquest of Eastern Turkestan, from which I will read some extracts.

"The campaign which commenced with the sieges of Urumtsi and Manas in the "autumn of 1876, and which was brought to a close with the fall of Kashgar in "December last, is beyond doubt the most remarkable military enterprise which has "been attempted by any Asiatic nation within the present century. If we simply "consider the enormous distances over which large bodies of men have been trans-"ported, the feat must be admitted to have been no ordinary one; but when we "have added thereto such difficulties as those caused by the barrenness of the "region in which the war was to be carried on, the reputed strength of Kashgar, "the hostility of the Mahommedan population, and the scarcely concealed distrust "of Russia, we find that the task which a Chinese General and a Chinese Army "have accomplished is one that deserves to rank with many of the most celebrated "of European campaigns.

"In the year 1875, the Chinese Government resolved to chastise the rebel Powers "which had broken away from its control in the country lying beyond the province "of Kansuh. The chief of these were the Tungan rulers of Urumtsi and Manas, "and Yakoob Beg, the Ameer of Kashgar. At Lanchefu, the capital of Kansuh, "troops were accordingly collected in large numbers, and the necessary stores and "supplies of cannon and ammunition were forwarded with as little delay as "possible to the same place. Before the close of the year 1876, the first of the "rebel Powers had been overthrown, and Chinese influence and prestige restored in "what, for want of a better term, may be called the region of Ultra-Kansuh. It "now only remained for the Chinese Army to deal with the second and more "formidable Power. In the short space of twenty-one days the Chinese had "marched close on 400 miles, captured three cities, and won one pitched encounter.

"The joint armies of Tso Tsung and Kin Tang pressed on against Kashgar itself, "and after winning a battle underneath its walls, in which Kuli Beg was wounded, "the capital of the dominions of the late Athalik Ghazi once more was entered by "a conquering army from far-distant China.

"Such, briefly narrated, is the story of the Chinese re-conquest of Eastern

[1] An English friend connected officially with China puts the number at, at least, 25,000. There is every reason to believe it is increasing.

" Turkestan, and we think that no one will dispute the fact that, both in strategy " among their Generals and in endurance and courage among their men, this " Chinese Army has done much to revindicate the old and long-lost prestige which " attached to the soldiers of Kanghi and Keen Lung." [1]

From this account we may see that the Chinese troops are not only well equipped and well trained, as compared with what they were during our last war with the Empire, but that they are also well commanded.

The defence of their coast cities has not been neglected by the Chinese. At Canton, Woosung, and at the mouth of the Peiho, immense forts were being erected at the time of my visits to those places, and are most likely now completed. In some cases they are provided with iron plating, and in all heavy European guns are mounted. I myself saw, more than a year ago, a couple of 14-ton Krupps being disembarked from an English steamer for conveyance to the forts on the Canton river. I must leave you to draw your own conclusions as to the effect which this remarkable advance in the improvement of their defensive system is likely to exercise on the relations existing between China and the countries of the West. That they are resolved to do all they can to render their country strong, I think the step recently taken of sending young men to serve in the forces of foreign Powers is a striking proof, and it would not be easy to say what nation there is that has any right to regret such resolution.

If, as regards China, the determination to be guided by foreign instruction in naval and military affairs is but an exception to an otherwise unvarying repugnance to depart from ancient custom, in Japan it is merely a portion of a general scheme of imitation of foreign institutions. When first we became acquainted with the latter country it was under a curious system of government. The nominal Sove-

[1] The lecturer here read some observations of a writer in the *Pall Mall Gazette* on the above operations and the important military position lately assumed in China.

" . . . Henceforth China is more than ever a power to be reckoned with in " considering the affairs of Central Asia."

" Yet the change may prove of considerable moment in many ways, and the " manner in which it has been brought about gives a vivid impression of the vigour " which may some day be displayed by the Chinese in asserting what they conceive " to be their rights, however long they may allow their claims to lie dormant."

" By the end of last year the whole of the territory which Tso had set out to " recover for his Imperial master had been completely overrun. . . . What " more, we may ask, could have been done, we do not say by Russia, but by an " European country? . . . Surely when we talk of the disintegration of China, " the hopelessness of improvement, the incapacity of the race for great military " undertakings, such an instance as this following so close upon a similar expedition " [that against Yunnan] in another direction should make us pause. . . . Many " observers, from the Abbé Hue onwards, have pointed out how formidable a Chinese " Army well drilled, well armed, and above all well led, would prove should such a " force ever take the field. The men are hardy, industrious, educated, indifferent " to life; and though they themselves are averse to war, their Tartar rulers are not.

" He would be a bold man who would venture to predict the future of China, but " one thing seems certain, that, in spite of famines and misgovernment, her people " will play a much more important part in the history of the Eastern world in time " to come than they have of late years; and for this it behoves us, as the country " most nearly concerned, to be prepared."

reign, the Mikado, was overshawdowed, and shorn of all real power by a powerful official, to whom foreigners have given the name of Tycoon or Shogoon. The Shogoon practically was but a leader amongst a number of powerful peers—*primus inter pares*. The latter, with a host of minor barons, were in much the same position as the feudal lords of Western Europe in the middle ages. Each exercised sovereign power in his own dominions, and was obeyed by an army of retainers maintained out of the revenues of his territory. A military class existed, the members of which alone were entitled to bear arms. Known by the designation of *Samurai*, they claimed to be considered gentlemen, and are always represented as such by our earlier authorities. A feudal force in Japan resembled a feudal array in Europe. A Dutch minister of religion, who was in Formosa in the sixteenth century, in giving an account of Japan, says, "the gentlemen who "served on horseback were obliged to keep five, ten, or twenty "servants, according to their different qualities and estates; these "servants are obliged to fight upon occasions as well as their masters." The qualifications required of a gentleman who served in the Army were, to be "very nimble and active, very well instructed in the exer- "cise of arms, not ignorant in books; and above all he must have the "reputation of being a man of honour." A yearly revenue of 10,000 florins carried with it a liability to bring into the field a following of two horsemen and twenty foot soldiers. We see here the whole system of knights' fees, men-at-arms, esquires, and yeomen, as it was understood in feudal Europe. According to Captain John Saris, who visited the country in 1612, there were garrisons maintained by the Shogoon in several of the principal cities. These apparently formed a regular standing army. The cavalry, the same authority tells us, wore complete armour, and carried very short carbines (matchlocks, which they had learned the use of from foreigners), javelins, darts, and sabres. The infantry wore helmets, and were armed with two swords, a kind of pike, and occasionally firearms. The discipline was good, and the system of tactics elaborate. According to Kaempfer, the whole array of the feudal baronage amounted to some 300,000 foot and 38,000 horse. The Shogoon had of his own 100,000 foot and 20,000 horse. The practice of wearing armour, and of depending upon the sword and the bow as offensive weapons rather than on firearms, lasted till very recently. In the civil war of 1868, the great Princes of the Empire took the field encased in mail, and muskets were but little used by their vassals.

The limited intercourse with foreigners which for nearly three centuries the Shogoon's Government permitted the Japanese to maintain, still led to the introduction of some modifications of their military system. Certain of the more independent feudal chiefs adopted contrivances for the improvement of their armaments which had been in use in Western countries. Firearms were improved, cannon were mounted in forts, and the defensive works which protected the chief sea-ports of the Empire were in many cases unquestionably designed in pursuance of the instructions of Western engineers. Some of the detached forts which stud the bays of Yedo and of Ozaka

are of polygonal trace, and at the epoch of their construction were in advance of many of the coast batteries of more progressive countries. When the Shogoonate entered into negotiations with Western Powers steps were taken to place the naval and military forces of the *Bakufu* —as that Government was called—on a more improved footing. Arms were purchased from foreigners, and ships were built after Western models. Foreign instructors were engaged to train Officers and men for the land and sea forces. French Officers for the former, and our own countrymen for the latter. Dr. Rennie says, under the date of 1861, "The Tycoon's Government is certainly now beginning to train "troops according to a modification of the European system;" and he visited barracks of disciplined Japanese in 1862. When Lord Elgin went to Yedo in 1858, there was a squadron of two square-rigged ships, and a couple of steamers lying in the bay. Mr. Laurence Oliphant went on board one of the former. His account of her enables us to form some idea of the progress that has since been made. In shape, she was "like those cumbrous arks in which our ancestors used "to circumnavigate the globe." She was painted a bright red; her masts were of ponderous size; and her rigging was bleached white from the action of the weather and the absence of *blacking*. A few 32-prs. were lying about the decks; but there were no carriages nor side-tackle bolts to be seen. When our forces attacked Kagosima and Simonoseki we found the Daimio's troops who held the works at both places not at all ill armed and fairly well commanded; but European tactics had been hardly adopted at all. The disturbances in the country which ended in the restoration of the Mikadoate in 1869 led, as we know, to a wholesale introduction of Western customs. An Imperial Army and Navy were formed, and replaced the feudal array of the now disestablished barons. A new naval college was set on foot at the capital, and, under a succession of Officers of the British service, has turned out a body of naval Officers but little inferior in their acquirements to those of Western navies. Dockyards were established at Yokosuka, near Yokohama, and at Nagasaki, and ships were purchased in Europe, or laid down on the new building slips. Seamen were regularly trained, and a corps of marines, on the plan of our own distinguished force, organized under an Officer of that service. The Army was trained by Frenchmen, and its ranks were still filled only with *Samurai*, the military class, whose members resembled but too often the "ruffling cavaliers" of the Elizabethan period. Young men belonging to both Army and Navy were sent into the services of foreign Governments to learn their duty. At the present moment Japan possesses something more than a respectable fleet. She has four ironclads—two but recently constructed in this country —some fifteen other vessels of the cruizing classes, and five training ships. All the above are steamers. In addition to the naval yard at Yokosuka, in which the large ironclad to which I belonged when on the station was docked, there is a splendid dry dock, capable of taking in the heaviest ships, nearly completed at Nagasaki, and an important steam factory at the same place. Japanese men-of-war have made long voyages, and one, I believe, may be expected shortly in this

country. It need hardly be said that arms of the most improved pattern are mounted on board the Mikado's ships.

The Government has recently done, as many Western administrations have done, and has copied the Prussian system of army organization. In December, 1872, an Imperial decree made known the plan and details of the new system. The preamble, perhaps with unconscious irony, declared that this considerable augmentation of warlike power, and the extension of liability to serve to the whole population, is "in accordance with the spirit of 'the age!'" Thus is the spirit of Western civilization interpreted in the far East! The *Samurai* are no longer exclusively liable to service. All Japanese are now subject to conscription at the age of twenty, and may be enrolled in either the Army or the Navy. The former is divided into standing army, reserve, and militia. Service in the standing army lasts three years. The 1st Reserve is composed of those who have completed three years' service. They are called together twice a-year to live in camp and be drilled. After two years in the 1st Reserve, they pass into the 2nd Reserve, and are then liable to be called out only when the levy *en masse* is made. All males between the ages of seventeen and forty, not included in either of the above classes, belong to the militia. The minimum standard of height is 5 feet 1 inch.

The Empire is divided into six military divisions; and there are thirty-seven camps and garrisons. The following is a detailed statement of the strength of the Army on a peace and on a war footing, all the troops belonging to which are armed and equipped as in the foremost European countries.

Troops.	Peace.	War.
Infantry { 14 brigades / 42 regiments }	26,880	40,320
Cavalry, 3 regiments	360	450
Artillery, 18 companies	2,160	2,700
Engineers, 10 companies	1,200	1,500
Military Train, &c., 6 companies	360	480
Marines, 9 companies	720	900
Totals	31,680	46,350

Besides the above the Imperial Guard consists of the following picked troops:

Infantry, 2 brigades (4 regiments)	3,200
Cavalry, 1 regiment	150
Artillery, 2 companies	300
Engineers, 1 company	150
Military train	80
Total	3,880

The total strength of the standing army, on a peace footing, is 35,560, and on a war footing, 50,320 men. We read in a recent work

on Japan, that "the details of the military law have been well carried "out, and the scheme realized." It is in contemplation to introduce German instructors in place of those of French nationality. On an emergency it is believed that Japan could put into the field 75,000 disciplined troops.

This brings us to an end of such examination of the naval and military progress of China and Japan as I have felt capable of making. I feel how incomplete and imperfect it is, but I hope I have been able to call attention during it to the great advance those two countries have made.

Captain COLOMB, R.N.: Naval people in passing from China to Japan and back again naturally make comparisons between the two countries, especially with reference to their capacity and progress in the art of war. Now I think you can see from the lecture we have just heard that my friend, the lecturer, dwells upon the capacity and progress of China for war with more lingering lovingness than he does on that of Japan. I myself am inclined to think that Japan, upon the whole, has greater capacities of that kind. But there is this great difference between China and Japan which struck me every hour that I passed in Chinese waters, and which I think cannot fail to strike anybody who examines the characters of the two people, as seen in their own country. It is this, that Japan is a revolutionised country, and China is not, and I cannot help thinking that if the tremendous political convulsion which a revolution in China means, were to take place, we should see a progress in that country in the art of war as in other arts, of which we cannot at the present time from any comprehension whatever. Then on the other hand, looking at the characters of the people, you see two great differences throughout. Amongst the Japanese there is that which we have been accustomed to call "chivalry," although Japanese chivalry is not exactly parallel with what we understand by the term in England. Now in China that character of chivalry is totally absent. I have never heard of any instance in China of that sort of self-sacrifice which we understand by the word "chivalry." Now it seems to me that for capacity for war you must have at the bottom that capacity for self-sacrifice which is meant by chivalry. On the other hand there is this to be said, that you may have the most magnificent soldiers—speaking of private combatants—without one single grain of chivalry, provided they are properly led. I take it that the Chinese have that, that is to say, that there is immense capacity for war amongst them if there are the leaders, but in spite of all that the lecturer has said about the astonishing progress of the Chinese in Kashgaria I am not yet converted. I think China will never become a great military nation unless she sticks to European leaders. In Japan I think it is different; I think the Japanese have the power of leading men; I think that they have the capacity of becoming not only private soldiers but Officers in command and Generals. Now there is another quality which must be found in a nation which aspires to progress in the modern art of war, and that is accuracy. You cannot at the present time carry out war without an attention to accuracy of details which was not required in olden times. You require accuracy of organization, you require especially accuracy of manufacture in your weapons, and I think that when you speak of the progress in the art of war of Japan and China, you must speak also of their progress in the art of manufacturing the weapons of war. The two countries are totally different in that respect. In China no manufacture once trusted to the hands of the Chinese themselves, remains as it was at first: it invariably becomes worse and worse. We have always been accustomed to hear of the power of the Chinese for imitating: they do imitate things from a pattern uncommonly well; give them something to make from a pattern, the first object that they turn out will be exceedingly like the original; but take away the original, and the second copy will be worse than the first; take away the first, and the third will be worse than the second; and so on, the manufactured article after it has passed through all these stages becomes absolutely and entirely different from the original pattern. In Japan, on the contrary, after any number of passages through these

patterns, the last object will be quite as accurate and complete as the first was. There is an instance of it which is, I think, conclusive. In the Imperial Mint, at Osaka, in Japan, which is chiefly in the hands of Japanese workmen, there are a few European superintendents, but the work itself is done by Japanese workmen. Now I saw the worn out steel dies which had been supplied from England some years before, and I compared them with a very powerful magnifying glass with those that were made by the Japanese themselves. It was quite impossible to detect any difference, and the coinage of Japan, which is entirely in the hands of Japanese so far, is quite as fine and good at this moment as any coinage in England. Now take on the other side the accuracy of the Chinese workmen. In the arsenal at Shanghai, which Captain Bridge and I visited together, and where, as he mentioned, there is a large manufactory of Remington rifles, I went to one of the benches where the most important part of the rifle was being made—the sight—and I found that even there in that manufacture, the lengths of the sights differed by as much as half an inch. It has always seemed to me that there is that flaw in the Chinese character, that they never quite comprehend the whole question before them; they copy a thing but they do not connect it in copying it with any other part of the matter with which they have to do. Captain Bridge has spoken of the incongruity that we witnessed between the rifle practice according to the Hythe rules, and the double sword practice, the most comical, I think, except the spear practice, of any drill I have ever seen. I am quite certain that every drill in China, once it is left to the Chinese themselves, deteriorates and becomes ultimately a sort of ballet. We landed at a port in the North of China one day where some troops were being drilled by English word of command. The troops were armed with excellent rifles and field pieces, but there was this incongruity that there was a flag to every third man. You see the same thing when you come to examine other Chinese works. Take for instance the casting of guns. One day I went over the arsenal at Hankow with Dr. Macartney, and he showed me a cast 64-pounder which has been turned down to represent in outward form an ordinary Armstrong gun. The history of it was this, that he had gone away from the arsenal and the Chinese superintendents were left full control for the time. They had got hold of some drawings of the rifled guns, and they had actually turned down this large cast-iron gun under the impression that if they made the outer shape of it to correspond with the drawings they had made that gun an efficient rifled gun. But still there is no question but that the progress of China in the art of war, although slow, is on the advance, yet my difficulty is this, whether China, left to herself, will fall back into her ancient arts of war, or whether she will make any advance. So the same question remains in Japan. Japan, as I say, is a revolutionised country, and the effect of revolution of course is to stir minds to an extent to which nothing else will stir them; it consequently appears to the casual observer that the progress of the art of war in Japan is more rapid and solid than that of China, but on the other hand if I take away the element of revolution from the two countries I remain in doubt whether my conviction is a right or a wrong one.

Admiral Sir ERASMUS OMMANNEY: I should like to ask Captain Bridge, as China is likely to become a naval Power, whether he has thought of the great resources which China holds in her coalfields, because I think when she comes to work these coalfields she possesses the greatest power of equipping a steam navy of perhaps any country in the world. I do not know whether his attention has been called to that circumstance. If there is any development of coalfields in China no doubt she will have the means of keeping very formidable steam fleets.

Lieutenant-General Sir H. NORMAN: I may mention one little point which will show the great progress made by the Japanese of late years in one rather important branch connected with the Army and Navy, that is, the hospital. I happened to be at Nagasaki last year when the rebellion was going on in the Southern Province, and a steamer loaded with wounded soldiers was brought into the harbour. I asked permission to go over the field hospital; there was some little difficulty at first, but eventually I was allowed to go. I was accompanied by a medical Officer, who had had a good deal of experience in war, and knew a great deal about the treatment of wounds. We were conducted round the hospital, which was extemporised by two medical Japanese Officers in uniform. I never saw field hospitals in war better con-

ducted; everything was clean; there were no smells; the men were well attended to, and had every possible comfort. Several of the men who were badly wounded had their bandages undone to show the medical Officer who was with me, and, according to his views, the treatment could not have been better if it had been carried out by our own medical Officers. I certainly went on board our steamer again with a profound conviction of the great progress that had been made by this nation in the last twenty years; a conviction certainly not weakened by what I saw afterwards when I visited the naval dockyard and other Government institutions in the neighbourhood of Yokohama.

Colonel CLINTON: I think the subjects of this lecture are very interesting, but they hardly can be said to compare one with the other. I made some time ago a comparison between the different nations of the world, and found that there are but two or three nations worth considering as far as population goes. The enormous population of China stands first in the world as a power, supposing you have the will and skill, the time and the credit for carrying out any views you may choose to carry out. In the same way with the English Empire, if you have the same qualifications, you can establish an army of 20,000,000, if you please, you have the power of doing so. The Chinese could put 40,000,000 into the field, and the English Empire 20,000,000; therefore I think it is hardly worth while speaking about the progress of Japan when you think of what other nations can do.

Captain BRIDGE: I should like to occupy one or two minutes in trying to vindicate the Chinese, for whom I have the most friendly feelings, from a charge (if I may so call it), that Captain Colomb has, I think, brought against them of want of chivalrous feeling. (The CHAIRMAN: I do not remember that he did that.) An absence of chivalrous feeling then. I think the history of the conduct of the Governors and Officers commanding some of the fortresses in Eastern Turkestan, when that district was taken from the Chinese Empire, that district which has recently been re-conquered, is almost unsurpassed in any history. We know that in the Navy it used to be thought that a Captain should always go down with his ship—it was looked upon as the proper thing to do—the ship should be sunk rather than the flag struck. Things of that kind were frequently and repeatedly put into practice by the Governors of fortresses in Eastern Turkestan, for they would not surrender. It may have been unwise from a strategical point of view, although that is doubtful, as they probably would have been massacred as soon as they did surrender, but when they found that there was no hope of retaining the place attacked by the insurgents, they simply fought to the last, and either blew themselves up and as many of their enemies as they could, or allowed themselves to be killed in the breach. The particular point to which Captain Colomb has called attention, viz., the deterioration in a manufacture when it gets into the hands of the Chinese, undoubtedly exists, and what he has said quite coincides with my own experience. He called my attention, I particularly remember, to the fact of the difference in the length of the sights that were being made in the Kiang-nan Arsenal, near Shanghai. It certainly was the case that there were scarcely two sights of the same length; but I am not quite sure that we should not find something of the same sort in a factory in Europe, where we had not got a very large number of highly qualified leading men. Now, the Chinese in undertaking this manufacture so new to them, the manufacture of arms of precision, were somewhat in the condition of unskilled labourers without any very skilled supervision or superintendence. With regard to the story of the 64-pounder gun, which was turned down from an ordinary smooth-bore until it resembled in appearance an Armstrong rifled gun, I think I can parallel that by a story told me by an English Officer holding a very high appointment in the Naval Establishment at Yedo. A new mainyard was required for a training ship attached to the naval establishments at the capital. A mainyard is not simply a piece of wood, but is composed of several pieces of wood, and the outside, so far from being smooth, is full of all sorts of elevations and depressions and ribs and bands. An order was sent to the dockyard in the usual way to make a new spar of the nature required for this training ship, and some drawings were sent of the plan on which it was to be made. A mainyard came back from the shop which exactly came up to the drawings, but it was not made of several pieces, it was *carved out of the solid*. It was simply a

piece of wood of sufficient size carved out by some of those skilful Japanese carvers, whose skill in ivory work and wood carvings of various sorts we know well in this country. One thing that at this moment tends to give Japan, in my opinion, a superiority in military and naval organization, and also military and naval power over China, is that they have not yet lost the old feudal traditions. Japan had, to her good fortune, for a long time, a feudal system and an aristocratic class, and those things provided her, to a great extent, with natural leaders for her naval and military forces; but the feudal system has been altogether abolished, the aristocratic class has been put under disabilities and it in time will disappear. Whether, when the new generation, which is being taught to look upon the feudal system as something obsolete and unsuited for the country, and which loses all the aristocratic traditions, whether, when that generation comes to the head of affairs, we shall find the Japanese Army and Navy as well officered as it is at present, is a matter of which I have very considerable doubts; and I am inclined to think that as in China there is practically no aristocratic class, the two countries will be placed more on a level in that respect.

I had not alluded to the very important question which Sir Erasmus Ommaney mentioned, the existence of coal in China, although I am not unaware of the great wealth of the country in that particular. In fact, I visited some coal mines in Formosa, which are about to be worked with English machinery, and there can be no question that it will add greatly to the efficiency of her steam Navy—this facility which she has of providing them with proper fuel.

Sir Henry Norman was good enough to give us some information about the military hospitals in Japan. I think one of the things most to the credit of the Japanese, is the persistent way in which they have endeavoured to establish a native medical school. Every person who has visited that country has been struck with this. All over the country they have established hospitals; there are Government Medical Officers in most considerable places, and attempts have been made to teach rudimentary knowledge of hygiene and physiology in the public schools of the country. I was particularly struck in visiting the exhibition held in the Mikado's Old Palace at Kiyoto, some couple of years ago, by the number of anatomical plates shown, some of them, I believe, drawn and printed in the country, and although I was not able to pass an opinion upon their correctness, yet there is no doubt their execution was admirable.

Colonel Clinton spoke of the smallness of the population of Japan not giving it any weight in the affairs of the world. Now the population of Japan is small by comparison with the great population of China, but it is about double the population of the Kingdom of Prussia when the Kingdom of Prussia undertook the great campaign of 1866, and as there is at present a still existing military class, numbering some millions, I think it would be unsafe to rely upon the want of pugnacity or absence of aggressiveness of the Japanese people on account of the smallness of their population. They certainly exhibited considerable pugnacity and a strongly aggressive spirit in their dealings with China with regard to Formosa, and in their dealings with the Corea, and they are at present enjoying the advantages of having forced another country to make a treaty with them, or to modify a treaty on the implied threat of war, without the trouble or expense of going to war for it, an advantage of which we, perhaps, have had some experience of late.

The CHAIRMAN: I think I may ask gentlemen present to give their best thanks to Captain Bridge for the lecture he has given us.

LECTURE.

Friday, November 29th, 1878.

GENERAL SIR J. LINTORN SIMMONS, R.E., G.C.B., Inspector-General of Fortifications, in the Chair.

MILITARY MAP MAKING.

By CAPTAIN HOLDICH, R.E., F.R.G.S.

Sir LINTORN SIMMONS said he had much pleasure in introducing the lecturer, Captain Holdich, Royal Engineers, who had had a large and varied experience on the Indian Survey, and would be able to give some interesting information respecting the mode employed of producing the excellent maps of that country, some of which were on the table. He said that it often struck him that those who used maps seldom reflected on the trouble which it took to produce them, or of the perils which often had to be endured before a line could be engraved. Those who were employed on such work in uncivilized countries had, indeed, no easy task, and deserved the best thanks of those who availed themselves of their labours. He would not take up the time of the meeting with any further remarks, but would ask Captain Holdich to read his paper.

IT has been rightly said that geographical discovery is the heritage of this century. One of the most direct, if not the first, results of geographical discovery is geographical map making, and in the wide sense in which all geographical maps lend themselves to military purposes, the geographical map and the military map may be classed together.

By a geographical map, I mean a map executed on such a scale as may show all the principal topographical features of the country it represents, all, in fact, that is most essential for the successful conduct of military operations, without including any large share of that which has to do purely with the civil administration or government of a country, such as field measurements for the proper assessment of revenue, or for such technical engineering operations as railway or canal making, having for their object the advancement of the resources of the country. Yet we find now-a-days, that increased accuracy in the construction of the first maps of a country, does, in many cases, supply much of what is necessary towards the development of means of communication through it; nor is there any reason, with a proper system of construction, why these first maps should not answer all purposes, until the country has reached a very high state of development as regards its natural resources, when it is reasonable to conclude that its wealthier stage of existence justifies further out-

lay on maps on a large scale and of an expensive description. I think we shall be justified in calling the first map of any country a military map. It may happen that it is nothing more than the compilation of the routes of various travellers, or it may be a more exact reconnaissance, founded on a mathematically accurate basis, but it generally happens, that the first application of the geographical knowledge so obtained, is one which tests its value more or less from the military point of view, and, indeed, it not infrequently happens that military operations first supply the geographical information.

The exact relations which exist between the topography of the earth's surface and the course of military operations is a deep study in itself. It is not necessary to enter into it here, so long as all military men are agreed that a knowledge of the topography of the country forming the seat of war is of the utmost importance to the General who essays to conduct a victorious campaign, or who wishes to protect a long line of frontier from the evils of constantly recurring border warfare.

For reasons of this nature, we find, in India, that there has been a constant and an ever increasing demand for military maps almost from the beginning of our occupation.

While the Government has been growing in strength and the requirements of revenue assessment and collection have raised a special system of survey which cannot be classed as either geographical or military, and which is more analogous to our ordnance surveys of Great Britain, there has sprung up side by side with it, but totally distinct, a system of topographical surveying, which is purely military in its character, which is applied to all native states and dependencies, and which is spreading yet wider every day over every mile of country into which we can by any possibility penetrate. Commencing some forty or fifty years ago, on the system which is even to this day taught in our military schools and colleges, it has gradually improved in the hands of many able men, owing much to the happy introduction of plane tabling by Colonel Robinson (late Director-General of Telegraphs), till now, though very far from perfect, it has entirely changed its original character, and can claim a high place among the survey systems of the world.

On the other hand, looking back over the same period, it is curious to observe how very little of such geographical surveying has fallen to English military surveyors out of India. It is, therefore, no matter of surprise at all, that we find the same instruments (the same, only vastly improved in detail) in use for military surveying as were in use twenty years ago. The attention of scientific men has never been called to this subject by any special demand for its application, while the demand for more exact and improved scientific methods in numberless other directions has been incessant. But it is no longer so. The first geographical map of any extent that has been undertaken by English Engineer Officers on the English system for many years has just been completed in Palestine, and if this map has been constructed for special objects, far enough removed indeed from any prospective value from a military point of view, yet, who will dare to

say that they can *never* have a military significance in future? That a survey of Cyprus should have been found necessary can be a matter of no surprise to anybody. Indeed, it is not too much to say, that the sort of map which has hitherto existed of that island, is not altogether a bad index of the sort of Government that has prevailed over it. History teaches us that wherever a strong Government gradually lays the foundation of a strong rule, it is mainly by the agency of a perfect knowledge of the country that that rule is established. If we look at the geographical position of Cyprus, with respect to the new formed frontier of Russia in Asia Minor, can the value of a further knowledge of the military features of the wild country that lies between them be any matter of doubt? Have we that accurate knowledge which is so essential, or is it possible that our military map makers may find further scope for their energies here? We have, at any rate, a work of high importance immediately before us in the definition of long lines of boundaries in Bulgaria, Roumelia, and Montenegro, and what does this mean but a considerable demand for geographical map making. Probably no technical survey requires more accuracy than a boundary map. The very essence of a good boundary is that it should last for ever, beyond the reach of a jealous rivalry between border clans, or the more energetic protest of actual border warfare, to alter or disfigure—or of the slow but surer waste of time and climate to obliterate. This can only be reached by making the utmost use of the landmarks of nature. Topographical features of no great significance assume an importance they would not otherwise possess from their very immovability. Yet clearly time and means are all-important considerations in the construction of these maps. They must be accurate, but they must be made quickly, with no large staff of surveyors nor with instruments of the highest class. And this, after all, appears but a small part of what probably lies before us in the shape of military map making. There is more than a whisper that such maps are urgently wanted in Egypt. We know that steps are being taken to commence what must hereafter expand into a most important survey of this class in Griqualand and in the highlands of the Transvaal; nor can we see to the end of all this. Do we know how much of Asia it may fall to our lot to map? All we know now is that there is an ever urgent demand for maps all along the extended border land of India; that never again will a military expedition cross that frontier and return without the security of a good military map; that all through that great debateable land lying to the north-west of our Indian Empire, where geographical knowledge means military strength, it must fall to the lot of one of two great Powers of Europe to secure that knowledge within a few years' space of future time. We see enough, I think, to make it clear that the subject requires our deepest attention—and that now is the time to make certain what system we mean to follow—what promises best to give us the greatest combined advantages of rapidity, economy, and accuracy in the construction of our military maps in future.

One of the best methods (if not the only one) of estimating rightly the value of any future system, is an examination of what may

have been done in the past towards the production of accurate maps under given conditions of time and cost. And here arises a difficulty which cannot be wholly set aside. If systems are to be judged by the maps they produce, how are we to decide either on the abstract or relative value of those maps? There is no such thing as public criticism in the matter. If there were it would probably not be of much value. The widest possible divergence of opinion may exist even among scientific men on the subject. This will always be a difficulty, but we shall, perhaps, arrive at the safest conclusions by an examination of the field sheets of each survey (always bearing in mind that the final maps are but expositions of the skill of the photo-zincographer or engraver, and that the field sheets afford the only safe criterion in the matter) on its own merits, with respect to the conditions of time and cost of its construction, and as to accuracy. No two square miles of the earth's surface are probably exactly alike—and no two surveys of any extent can possibly embrace ground of exactly similar characteristics—yet, by a careful comparison of averages, we may arrive at very fair conclusions with respect to the time a survey should take in completion. With respect to accuracy too, there are certain well-known rules and indications that are sufficient to any experienced surveyor to decide the value of the completed work. But with regard to economy, we can never be quite safe in laying down a decided opinion, in saying that this map cost too much—or that too little. We can at best only estimate roughly what should be the cost of a given survey, and it must remain a matter of individual opinion in which the widest and longest experience is likely to lead to the safest conclusions. It is clear, then, that we must have full information about any map that we are looking at, before venturing to give an opinion as to its merits. And here comes the great bar to what might otherwise prove of the greatest value to us in the examination of the maps produced under foreign systems. Even if we could gain the privilege of an actual inspection of foreign field work, we could arrive at no definite conclusion without such information as we are not likely ever to obtain. There are but two countries in Europe that have lately been engaged in geographical work of the nature of that which we are now discussing, viz., France in Algeria, and Russia in Central Asia. But, undoubtedly, England has lately had in India the largest interests involved in geographical work, and the largest experience in carrying it out; and the Indian system, which is undoubtedly French in its origin, and is but a modification of what might be generically termed the Continental system (for it must be remembered that England stands quite alone in upholding a system which is about half a century old) may well be taken for the present as affording the most accessible as well as the widest basis for estimating what is best for the future.

The military or geographical surveys of India must be divided into three distinct classes.

1st. Those exact surveys on the 1-inch scale, which take the place of the ordnance sheets of the same scale in Britain, founded on a rigidly accurate basis, and which are always of such a high average in point

of accuracy as to entitle them distinctly to be classed as surveys, and in the construction of which economy and accuracy have ever been the guiding principles.

2nd. Those military reconnaissances covering wide extents of country, which frequently under favourable conditions might be classed as surveys, but which are often dependent on points whose value can only rank as second class, and sometimes on bases measured in the field having an abstract value of latitude and longitude of their own, and which are always executed under stringent conditions of time, and—

3rd. Those compilations of route surveys executed by picked natives who under various disguises penetrate beyond our frontier, and bring back recorded observations and route measurements from countries into which no European can enter.

The system adopted in the construction of the first two classes of maps is essentially the same, and it may be described in a very few words as plane tabling based on triangulation.

It is strange that it should be necessary to say a word about the plane table, an instrument so familiar to us in India and to every Continental surveyor. Yet it is an instrument of which the scientific use is utterly unknown in England, and it may possibly be as well to describe it. A plane table is a drawing board on three legs, easily levelled and retaining a free motion in azimuth; and to it are generally attached a ruler with sights at either end—one with an eye slit, and the other with a fine hair—and a compass, or magnetic needle, in a long box having a motion through a degree or two on either side of zero, which serves to determine the approximate azimuth of the table. It can be made as portable or as solid as you please, from the weight of an ordinary rifle, to those solid and somewhat clumsy constructions which we use in India, and which we like because it is more comfortable to work with a good solid instrument than with one of a more flimsy construction. The very description of it will be sufficient to suggest its cheapness. If money is expended on it, it is to secure fine finish and a neat appearance without adding anything to its utility.

It is used for the double purpose of triangulation and topography. Passing over its use for the present as a triangulator, the following is the manner of its topographical use. The plane table is roughly levelled and brought into approximate azimuth by means of the compass, so that the points previously fixed by triangulation and projected on it, are nearly or quite in true relation as to direction with the same points in nature on the surface of the country. The surveyor's position is then determined on the board by the simple process of interpolation, observations being taken through the sights of the ruler to three or more of these recognised points. If the three rays drawn along the edge of the ruler meet in a point the azimuth is correct, and the surveyor has nothing further to do than clamp his board and proceed to sketch the country before him by means of a series of observations through the ruler sights all round his position. There is little or no eye sketching about this. The rapidity with

which the true direction of any topographical feature can be ascertained, and marked, by a glance through the ruler sights, and its position verified by the observations from the next fixed point of interpolation, relieves the surveyor from any troublesome considerations as to its exact whereabouts; and it is this exceeding simplicity of use that makes the plane table so peculiarly suitable to the uneducated mind of the native, which is so strongly appreciative of minute accuracy in delineation, but which cannot be trained to that higher capacity for deliberate thought and judgment which sketching from nature involves. Should the plane table not be in true azimuth, the interpolated rays form a small figure, instead of meeting in a point, which figure at once reveals by the very simplest laws the extent of the error and the manner of its correction. So that the plane table becomes entirely independent of compass error induced by local magnetic attraction. It is easy to conclude from this that the plane table is a valuable traversing instrument as well as a triangulator, and the conclusion is perfectly sound.

The ordinary system of carrying out a military survey over any large tract of country is as follows:—The ground is first triangulated from an efficient base, which base, in India, can usually be obtained from one or other of those series of triangles that have been carried through the country by the G. T. Survey along lines of meridian and latitude, and now gridiron it completely. Even in the case of our military frontier expeditions such a base is generally procurable. The triangulator uses a first class instrument, either a 10″ or 12″ theodolite, and from the very commencement of his work he carries a plane table with him. When time permits the first preliminary reconnaissance of the ground is carried out by a plane table triangulation alone, which definitely fixes the position and number, both of the first class points or trigonometrical stations, and the secondary points or points fixed by intersection from three or more observations, and which becomes in fact the triangulation chart. For a first class survey this preliminary plane table triangulation may be regarded as indispensable. It insures the necessary number and quality of points, and it is of the utmost use in subsequently assisting the triangulator to recognise many of them which would otherwise escape detection even with the most powerful instrument. But it may happen that the excessive wildness of the country, its extreme unhealthiness, or the difficulty of moving about in it, may make the erection of many artificial signals an impossibility; even the selection of trigonometrical stations becomes a difficulty, and the one great point to be gained is, having passed over the country but once, to get out of it as soon as possible. In this case preliminary reconnaissances must be dispensed with, natural features such as hill peaks rising perhaps with painful monotony of form and colour from dense forest-clad plains, become the only available natural landmarks; and trigonometrical observations to them, with weary reiteration from day to day, would lead to a most hopeless confusion in the recorded observations—but for the plane table triangulation which must of necessity go hand in hand with the instrumental one. *Only* in this way could such a triangula-

tion as I have described be carried out. Indeed, I think, that not even by surveyors in India have the triangulating powers of the plane table been fully recognised. There is another important adaptation of them, as we shall see, in the case of military reconnaissances with a field force when other instrumental triangulation fails.

Into the details of theodolite triangulation, I will not enter further than to remark that true economy of time and labour is best found in carrying out triangulation to its fullest possible extent. To attempt first a bit of triangulation, and then a bit of topography, or to make the two go hand in hand can never lead to a large outturn of work. Further, we find that, for 1-inch survey work, about one trigonometrical station for every 100 square miles, and one subsidiary fixed point or signal for every ten square miles, is amply sufficient for topography, by plane tabling, or very much less than half of what appears necessary for any other system of topography from interpolated fixings.

But it is of course mainly in its topographical capacity that we find the highest value of the instrument, and it is in this capacity that we claim for it its chief advantages in rapidity and accuracy—resulting of course in economy—in the construction of maps.

Every one accustomed to the use of the prismatic compass will readily recognise four distinct origins of error in the use of it in conjunction with the protractor.

Firstly, there is the very indefinite error known as compass error from local magnetic influence which may vary infinitely, can never be readily measured, and so far as I know can never be eliminated. I have been in country where the compass would be totally useless from this cause alone. What is to become of one's sketch under such circumstances?

Secondly, there is the error of observation due to an unsteady instrument and imperfect graduation. I doubt whether under the most favourable circumstances an observer can be certain of the value of his observation to half a degree or so.

Thirdly, there is the error in the graduation of the protractor. I will presume that only circular brass protractors are used, when this error may probably be limited to 15′.[1] Ivory protractors are frequently absolutely useless from this cause alone.

Fourthly, there is the error in protracting the observed ray on to the sketch sheet. An inconstant error which increases directly in proportion with the length of the ray.

And if all these errors combine, and the interpolation fails, how are they to be adjusted, even if the surveyor could know exactly how each operates? It follows that observations must be taken to points at close distances, to reduce these errors to reasonable limits, and the triangulation must be close indeed to give the necessary number of points. And if we fix a definite limit to the length of ray, or distance from the point observed, beyond which that point becomes valueless for interpolation, it must be remembered that the number of points that it will be necessary to lay down by triangulation increases inversely as the square of that distance; *i.e.*, for half the distance it will be necessary to fix four times the number of points. Now an ordinary plane

table contains about 480 square miles of mapping on the 1-inch scale, and 480×16, or about 7,680 square miles on the $\frac{1}{4}$-inch scale, which is one found most convenient for a geographical reconnaisance with a field force. And if in that large area there are but four or five easily recognised and fairly well scattered points, which need not by any means be visible from every part of the ground included within the plane table limits, but only from positions of important elevation, there is at once a practicable, if not always very adequate basis for topography. The accuracy with which such points can be used as the basis for interpolation is limited only by the skilfulness of the surveyor in the use of his pencil. There is no compass error, for the plane table is independent of it. There is no error of graduation in the protractor, or of subsequent protraction, for the protractor is never used. The accuracy with which the angular observation can be taken with the ruler may be estimated at from 5′ to 10′. As 10′ subtends 15 feet at a mile, and as 15 feet would generally afford a definite centre at that distance, it may fairly be stated at 5′. This practically introduces no error whatever into the work. But suppose the table is not accurately adjusted in azimuth, an error is at once introduced, which varies directly with the distance. As the distance of the surveyor from his projected points increases, so does this error become more and more apparent; but, as has been before pointed out, its value and the manner of its correction become also more and more apparent with the longer ray, and as it can have but one assignable cause, it is easily eliminated at once. This is why the farthest points are used for reference for adjustment in azimuth, and the nearer ones for the purpose of interpolation. We give an average of one point to each 10 square miles, because an interpolated fixing from near points contains no appreciable azimuthal error, and saves the necessity of fine azimuthal adjustment. But you will observe that this number is not necessary to the accuracy of the work. The skill of the surveyor alone in the use of his pencil limits the degree of accuracy of this method of surveying. As to rapidity anyone who will take the trouble to compare the simple process I have described with that of observing with an unsteady compass, and then projecting with an inaccurate protractor on an equally unsteady sketching case, will have no difficulty in forming a conclusion for himself. It does, in fact, so far as we have evidence to prove it, take less than half the time. The extreme simplicity of the process of working with the plane table, combined with the readiness with which a slight amount of skill in drawing can be utilized when applied to a solid steady drawing-board, make it peculiarly suitable to the native workman. He masters the principles of it at once, has generally a keen sense of what is meant by accuracy, while he has no troublesome angles to recollect, nothing to record. A large share of military surveying in India is done by natives, and it is of the highest importance to remember that if ever for the future we mean to have such maps constructed at a reasonable cost, we must most certainly utilize local native agency. The result of the system is this: admirable 1-inch maps are turned out, often of the highest value in point of accuracy, and always of a high average in this respect, for

about 2*l.* per mile, or at one-fifteenth the cost of the 1-inch Ordnance Survey maps of England; such maps, that is to say, as are produced by reproduction from originals on a larger scale.

But it might fairly be doubted whether the plane table is equally suited to all classes of ground, all natures of survey that military map-making may entail. I think India has very fairly tested its capabilities in this respect, as the wide extent of India presents every conceivable variety of topography that is ever likely to be encountered in the great unmapped world at large. For mountainous districts and open country its value has long been recognized, but it is only of late years that any general use has been made of it in wide flat plains, thickly covered with forest trees and forest grass, where one may ride for a day's journey and see nothing in the shape of a natural landmark without diligent search—plains through which it is hard enough to carry triangulation even, and of which it would appear at first sight impossible to make anything like an exact survey without such an expenditure in clearing lines of traverse as would prohibit the work altogether. But hard necessity has gradually developed the traversing capabilities of the plane table in the hands of experienced workmen till it may fairly be said to meet the difficulties of the position in a manner which is perfectly satisfactory. The hopeless tangle of error which would in some places be introduced by local compass variation renders it imperative to resort to a system which is, if necessary, independent of the compass. It is not possible to describe the various systems of traverse in detail, nor the manner in which possible check is at once brought into play, and errors in every chain measurement detected and rectified on the ground. It is sufficient to say that the system has been brought to a considerable degree of perfection in those wild and often deadly districts which have hitherto remained unexplored over the remoter parts of India—districts such as no geographical surveyor working on the English system has ever yet encountered, and which will, I am sure, crush his system to death whenever he first encounters them, unless indeed he is content to abandon all idea of a survey in favour of a mere route reconnaissance.

It may be asked what *is* the English system? I should have had much hesitation in replying to this, but that all such geographical surveys (amounting to no great sum total all put together) as have of late years been completed by English engineers out of India appear to have been worked on one definite method—the same that was taught in our schools and academies fifteen or twenty years ago, and the same that, so far as I know, is taught in them still. The basis of topography on this system is interpolation by means of the prismatic compass. The only geographical work of any extent at all that has been completed of late years by English engineers on this method is the survey of Palestine, and this survey, though small, is just enough to test fairly a definite system, and to give us some basis for comparison of that system with others. Difficult as it may be to effect such a comparison, there are yet conclusions which are certainly justified by an examination of the separate conditions of its execution in the matter of time and accuracy. Without entering into details which have been already explained

elsewhere, and which must justly be considered as still subject to discussion, there are, I think, two broad conclusions which no one who has made the subject of map making a study can possibly avoid: 1st. That considerably more can be accomplished within a given time by a surveyor with the plane table than can be surveyed by the aid of the prismatic compass, other things being equal, and—2nd. That the best results of the compass system on any extended scale (and I feel sure we shall be right in reckoning that the very best has been made of the system in the present case) can only be a reconnaissance—in the usual acceptation of that term—and not a survey in the strict sense of the word.

I will not waste time in attempting a rather complicated definition, but I will remark that we distinctly claim for our 1-inch military maps of India that they are surveys, and not reconnaissances. There is nothing about them left to the imagination that can be expressed on the scale of survey.

The rapidity with which the true direction, not only of every topographical feature of importance sufficient to be shown on the scale of survey, but even of such minor details as a defined change of gradient in the rise or fall of the surface of the country, can be indicated by a single line drawn on the map, makes it at once more convenient to be exact in such definition than to trust to estimated distances and the general correctness of the eye. It is not everybody who can make a good topographical sketch by eye alone; but it is within the power of anybody who can use a pencil to make an exact survey with the aid of the plane table. In fact, one great reason of the gain in accuracy secured by working with the plane table is that it is highly *convenient* to be accurate. Now the value of this fact in relation to the lower classes (and therefore less highly paid) of skilled labour must be very obvious. In point of economy it is quite beyond the bounds of possibility to argue anything with certainty from such details as we are able to obtain of the rates of expenditure per mile on different classes of survey of late years. We know this—that in India salaries are enormously higher than in Europe generally in the case of all educated labour, and if they are lower per head for mere manual labour, still the necessity imposed by the climate of employing far more of such labour, estimated by the number of men, than in Europe, would tend to balance such difference. We know, too, that the expense of carriage is greatly higher in India than in Europe generally, principally because the surveys of India have latterly been carried through some of the roughest and wildest districts that it would be possible to find anywhere on the earth's surface; and yet with all these additional inducements to exceptional expenditure, it seems (on such general estimates of the cost of field work, not of the final maps, please observe, as we are able to obtain) that the cost of recent geographical surveys conducted by English Officers is very nearly, if not quite, as great per square mile as is the cost of our geographical surveys of India. But while admitting that the utterly different conditions under which such surveys have been conducted must greatly tend to invalidate any certain conclusions on the subject, there are just these general points which it would be

well to consider. First, that the cost of triangulation must certainly vary with the number of points that are to be cleared and laid down. The fewer such points the less will be the cost. And, secondly, that if, other things being equal, a man can turn out three or four square miles of topography where he only turned out two before, again there must be a corresponding decrease in expenditure. Still I would prefer to state it as a matter of conviction, rather than of proof, that plane tabling is the cheapest form of topographical mapping that is known.

But it is the application of the system to those wide geographical surveys which are now regarded as one of the most important results of our Indian frontier expeditions, as they are indeed of any expedition into new and unmapped countries, that the value of the plane table system is best and most fully experienced, because it has placed within our reach the means of gaining great results in a short space of time, such as never could be gained in any other way. To reduce to the order of a scientific map the wild chaos of mountain and valley, where interminable ridges and peaks bewilder the eye, depressing one with the sense of vastness and infinity, when the only basis for the work consists of a few wide-scattered peaks, eternally bound in snow and ice, secure for ever from the approach of the surveyor, is no small result to achieve, even in these days. And it is no small system that helps us to such results. We must have first a wide expanse of sheer map—a good broad sheet of drawing paper, in fact—in order to include within its limits those few peaks—widely distributed points, which have been previously laid down by triangulation—which may be all that can be given as the skeleton or framework of that which is hereafter to be a completed map. And next we must have a system which admits of minute accuracy of detail, free from the disturbing influence of terrestrial magnetism, or we shall not be able to reduce the scale sufficiently to admit of this wide area within reasonable limits of space, and still turn out a valuable map in the end.

All along our Indian frontier, from Beloochistan to Bhootan, there have been fixed from time to time, as opportunity has arisen, notable points and peaks in the great Himalayan chains, from short bases near the frontier immediately connected with the great triangulation system of India. These are the points referred to which enable the topographer to take his place at once in the field, and with no preliminary base measurements or triangulation further than his own plane table can secure for him, to map out the country right and left wherever he can obtain a footing. Until lately it was considered sufficient to have the line of route taken by the advancing force carefully traversed and measured, and to secure perchance here and there the position of some fine natural landmark to serve as a future guide. And although modern improvements in the smaller class of theodolites, and a wider experience of geographical surveying, have enabled us long ago to ascertain the exact position of many such remarkable points, yet, when all was done, and the routes and peaks adjusted and compiled, we had but the skeleton of a map after all. We had learned much of the highways, and nothing of the byeways of the country we explored. And yet the byeways

of these trans-frontier lands are just what we want most to know about. It is a knowledge of byeways, a topographical knowledge, in fact, that gives a Commander that power of making flank movements and of rapid concentration, which is all-important in modern warfare. And so the surveyor of the present day must give in results in sheer hard topography. If he accompanies an advancing force he must take his opportunities, of course, as he can get them, but his first general principle is to be always off the main route (of which it is easy enough to get particulars) and never on it, hard of constitution to make the most of a day's work, careful to judge where he may obtain the greatest results with the least expenditure of physical labour, keen to obtain the first information as to what is secure for him to reach.

Admirable work of this sort has already been turned out by many Officers of the Indian Survey Department, notably by Colonel Godwin Austen, of the Bengal Staff Corps, and by Captain Woodthorpe, R.E., at present with the Afghan force. And for the future, we may rest assured that we shall never turn our backs on a new country once entered, without a very fair knowledge of what we are leaving behind, a good security, indeed, for the success of whatever policy we may in future adopt towards it. But the military expeditions of the present day are short and sharp, and the surveyor can never reckon on working, except under cover of an advancing force. He can rarely be left behind, and will usually find his opportunities close when the main purpose of the expedition is once accomplished. Time, or in other words rapidity of action, must be his guiding principle, and so it has come about that this, the most rapid systen of executing topography that has yet been devised, is absolutely the only one that can possibly yield the results which modern science demands.

It may not be uninteresting to glance at the map of Afghanistan and see what possibly lies before us, in a not remote future, in the nature of military map making.[1] It can hardly be doubtful to whose interest it must be to possess the earliest and completest maps of Afghanistan, nor that the Government of India will make earnest and strenuous effort to obtain those maps. Without claiming any special knowledge of the subject beyond that which is within the reach of every Officer of the Indian Survey Department, I think I may venture to point out the probable course of such mapping operations, probable, that is to say, with due regard to all the thousand contingencies of campaigning which always at the last leaves the actual moulding of events in the hands of the ready-witted few who turn circumstances as they occur to the best account, irrespective of preconceived ideas and plans. We have, in the first place, already recorded the true geographical positions of many important peaks that surround the probable lines of route to Kabul, and these can be projected on to our plane tables, and give us our requisite basis for topography. We have, it is probable (I cannot state this from personal knowledge), a very fair reconnaissance of each of the three main routes we intend to follow,

[1] For maps of Afghanistan, see Generals Vaughan's and Hamley's lectures in this number.

either *viâ* the Khyber, by the Kurum, or by Kandahar. Further than this, most likely we know nothing. And we want to know, chiefly, what is the true position of the northern boundary of Afghanistan—what are the routes and passes coming from the north over those ice-bound hills, and where do they strike our highways, and what lies beyond Kabul on the north-west, and beyond the Kabul Ghazni-Kandahar route on the west, for a mere glance at the best map we possess (Walker's map of Turkestan, in four sheets) tells us that we know nothing here at all. As far as the two northerly routes are concerned, it will be observed that there is a rough parallelism between the valleys of the Khyber and the Kurum, and that between the two rises an important range containing some of the best peaks on which to base topographical work that a surveyor could desire; grand peaks to interpolate from, but impossible to reach within such short limits of time as will probably be afforded during the advance. No doubt these natural features, which are peculiarly favourable to the work, will be duly appreciated. A force advancing through a mountainous country must necessarily secure command of the hills immediately flanking the route on either side, and whether this is done by friendly arrangement with the hill people, or by military force, there are sure to be opportunities here and there for the plane tabler to get off the route and reach some tolerably elevated point from which to secure his topography. On each such point, from time to time, his position can (at least between Jamrood and Kabul) be correctly interpolated from points already known, and fixed by triangulation. And if one or two such topographers were working on the line of the Kabul, north of it, and others on that of the Kurum, south of it, the topography of the whole of the mountain range between the two would be correctly laid down, either party being able to see and sketch the reverse slopes of that range with even greater accuracy and ease than those of the minor hill masses on which they were standing. North of the Kabul river, too, it appears probable that a good wide strip of topography would be secured, which would be valuable, not only as the topographical knowledge of the country bordering a route always *is* valuable, but as most surely bringing to light the position of all routes striking that of the Kabul river from the north, if any exist of which we are not at present aware. But it is in the west and north-west of Kabul itself that the interest of such map making centres. It is quite possible that a topographical route-survey, consistently carried out from beginning to end of the two routes described, would carry its own triangulation in advance of it, and give a good trustworthy basis, even to Kabul for further extension to the great range of the Hindoo Koosh itself. But we may be sure that the basis for such important work as this would be strengthened in every possible way. A base-line might be measured and connected with Peshawur by differential longitudes obtained through the telegraph, which has lately yielded such remarkably good results. or by direct instrumental traverse, such as was the case in Abyssinia, with the various bases there. Opportunity and circumstances decide these matters, and make it unsafe, if not unwise, to speculate

on any imaginary plan of action which may embrace far more than can ever be realized. It is sufficient to say that it will be a work of the highest interest to the geographer, as well as to the surveyor.

But it is not always that such points as those to which we have referred—snow peaks or other fine natural landmarks—can be obtained. English military expeditions range over a much wider field than India affords, and they sometimes (as in Abyssinia and the Ashantee country) enter upon a corner of the earth's surface which has as yet no position of its own in geography, guiltless of anything in the shape of exact measurement, or of an initial base with an abstract value in latitude and longitude. Opportunities of acquiring geographical information under such circumstances are rare, but that such opportunities should be seized for the value that they may subsequently prove to possess (a value, perhaps, not only always to be reckoned or foreseen) is, I think, exemplified in the case of the Abyssinian Expedition. New relations are springing up between England and Egypt; whatever the bond may be that unites the interests of the two countries, that bond can scarcely grow less, and it may grow greater. We have an English Governor in the Soudan—we have a survey of the Nile prepared by English Officers. And will this indirect assistance which England has afforded to Egypt in opening up the resources of a vast continent—which from the superior elevation of our standpoint among civilized nations we are pleased to call "dark"—will it ever be withdrawn? Shall we ever retrace our steps down the Nile? It will be contrary to the teaching of all history if we do. Indeed, we cannot say even now that we have no interest in Egypt or the Nile. And new relations of which we hardly, as yet, know the exact tenour, have sprung up between Egypt and Abyssinia. Now, one of the results of the Abyssinian Survey is this: that 350 miles of watershed, dividing the basins of the Mediterranean and the Red Sea, which carried us along the highlands of Abyssinia from Sanafé to Magdala, is a measured base on the flanks of which are peaks fixed which overlook another great debateable land—which is to Egypt what Afghanistan is to India, a neutral zone which is occupied neither by Egypt nor Abyssinia; but of which a good topographical knowledge would be invaluable at least to one of them. And with these points and some few others, such as might doubtless be furnished by the Nile Survey, the plane tabler might start to-morrow and bridge over that gap, thereby not only adding something absolutely new to geography, but connecting by direct geodetic measurement the coast of the Mediterranean with that of the Red Sea as far south as Annesley Bay. In Abyssinia there was not even an initial point whose latitude and longitude were known, and in order to maintain anything like an accurate survey along that extended route it was necessary to be exceedingly careful about base measurements to start with. The plan adopted was very simple, and can easily be described in a few words. An initial base was measured with considerable care on the coast of the Red Sea at Annesley Bay. From the two ends of this base which were fixed by a series of careful astronomical observations with good instruments as to their position in latitude, longitude, and relative azimuth, a number of hill peaks on

the ridges adjoining the great plateau, along which the road to Magdala ran, were fixed by trigonometrical observations with a theodolite. It was far more than the limited capacity of the small party engaged in the work (three Officers only, with one non-commissioned officer of the Royal Engineers) was equal to, to carry a triangulation in this way from end to end of the route. So the plan adopted was as follows:—Another base was measured in the same way at Sanafé, the first camp on the highlands, and a third at Antalo, a fourth at Ashangi, and a fifth at Magdala. From each of them a certain limited number of points were laid down, and the ends of these bases were connected by an instrumental traverse which ran right through from Zula to Magdala, and was constantly checked by observations for latitude, which were of peculiar value in a route running nearly due north and south. Now this, it will be observed, was a very good skeleton of a map, but nothing more; the gaps were long between one set of triangulated points and the next, and without adequate topography the map when completed would convey no notion of the nature of the country traversed, nor would even be sufficient to check the doubtful work of those travellers who had done something towards elucidating the geography of the country previously. With those few points the plane table was found to answer perfectly both the requisite purpose of filling in its own triangulation between base and base, and of accumulating topography rapidly and effectively, till the survey was closed by the return of the columns to the coast, and the survey party broke down through sheer hard work. And though the advantages of the geographical knowledge so obtained may still, by some, be regarded as prospective, one cannot but look back with regret on the golden opportunities presented by that remarkable ridge sharply separating and overlooking the great basin of the Nile on the one hand, and the arid hills and salt plains bordering the Red Sea on the other, for the further acquisition of geographical maps, had there been more than two Officers with the force acquainted with the use of the plane table.

And in that branch of military surveying which we usually term reconnaissance, or military sketches, undertaken for the purpose of mapping on a larger scale portions of ground which may be the scene of military manœuvres, or of investigating the capabilities of different routes, work of the nature which usually falls to the Officers of the Quartermaster-General's department rather than to those of the survey: I can see no reason why the advantages of rapidity and accuracy of work should be of less importance than in geographical fields. So far I have referred only to the results of hard experience, and to truths which have been tried and proved; and so, with regard to a peculiar class of work, of which I have only had a small experience, I will speculate no further, even if I had time to enter into this most interesting branch of the subject, than to suggest that whenever and wherever in past days the prismatic compass as a means of interpolation has been used in the execution of such surveys, then and there will the plane table, after a slight experience gained in its use, be found more effective in every possible way. It is indeed most

especially to the offices of the Quartermaster-General's and Intelligence Department that the whole question of plane tabling is of the greatest importance. It is not with any reference to such surveys as our ordnance surveys of Great Britain (except where the scale of survey is very small) that I have endeavoured to make the system of plane tabling understood. It is most essentially adapted for rapid work in the field—no matter what the scale may be—and to such surveys as those now in progress in Cyprus and Asia Minor; and the plane table must be constructed with reference to the work it is expected to do. I have heard an objection urged on the ground of portability. The plane table can be made at least as portable as the prismatic compass and stand. I have had a light one made by Messrs. Troughton and Simms that leaves nothing to be desired in the matter of portability, while still retaining all the fundamental advantages of the plane table over the prismatic compass. I do not recommend one so portable, however, for the purpose of geographical surveys. It rarely happens that it is necessary for the surveyor to convey his own instrument about from point to point; and where, as in a hilly country, the labour of making one's way about is severe, it is by no means advisable that he should be called on to do so. *Comfort* is a not unimportant item of that sum total which leads to successful results. I have heard it remarked with much truth that it is a great thing to be able to *lean on* your plane table, if you wish to do so, without disturbing it. Solidity and stability are advantages decidedly to be considered in choosing an instrument for the field.

So far I have been able to remark but briefly and inadequately on two classes out of three of the military or geographical surveys conducted by English Officers in India. Of the third class, those route surveys undertaken by natives in regions untrodden by, and utterly closed to, the European traveller, I will not attempt an imperfect description. It is a new and most deeply interesting branch of geographical research, only imperfectly understood as yet, which I mention chiefly in the hope of securing the attention of geographers and travellers to it. Wherever we have a base or line of frontier from which to start, or from which a current of trade however small, by means of caravans or otherwise, ebbs and flows through unknown regions beyond it, there is undoubtedly our chance of utilizing that latent power possessed by the native of every class or kind for adapting himself to disguise, and for the patient performance of feats of endurance in the reckoning up of paces day by day through each long day's march, which is certainly not shared in a like degree by the European. The best respect we can pay to the memory of such men as Montgomerie (whose name all geographers must recognise) is to study the legacy of experience which he has left us. What has been done in Asia can surely be done in Africa. There are no tales of pluck and enterprise in connection with our trans-frontier explorations that have not their parallel in the many stories of African travel. I cannot believe that India possesses the monopoly of such men as the gallant old schoolmaster of Kumaon, Pundit Nain Singh, who has recently been recognised by the award of the highest honours that the Royal

Geographical Society can bestow. Who can doubt that herein is a great latent power as yet unutilized and undeveloped, that is awaiting the first practical mind contented with the humbler *rôle* of compiler rather than that of discoverer to develop into a valuable aid to geographical science?

With regard to the maps on the table before you, I may remark that they all of them represent work done by plane tabling. I much regret that I cannot procure specimens of original field work. The necessity of drawing maps with a special view to reproduction by some process involving photography has had a most unhappy tendency to reduce the art of topography to one monotonous level of dull mediocrity. Amongst our original sheets are to be found many really artistic specimens—truly artistic in the sense of being so true to nature that the geological formation of the country is distinctly recognisable in the topographical delineation. But these finer effects of art are sadly apt to disappear in the process of reproduction. On the other hand we know that a skilful artist may make up a very presentable map from very slender material, and the fiction may be barely recognisable in the photozincograph. Of those before you I can guarantee that the originals *lose* rather than gain in the reproductions, and there are one or two to which I would invite special attention.

1st. The sheets from the Karte Federale Suisse, kindly lent me, together with the French sheets, by the Marquis de la Ferronnays (who will, I trust, shortly address you on the subject of plane tabling in France), which are exact reproductions on the same scale as the plane table sheets.

2nd. The first plane table maps ever executed in India by Colonel Dan Robinson, R.E., for which—with others—I am indebted to the kindness of Mr. Trelawney Saunders, the chief of the Geographical Department of the India Office.

3rd. The maps of Ajmere and Simla, on the scale of 16″ and 24″ to the mile—which represent the largest scale work done by the aid of the plane table, executed by Captain Strahan, who will also, I hope, have something to say this afternoon.

4th. A sheet of the survey on which I have recently been engaged in the Central Provinces, which is of interest as it shows what may be done by traversing in a particularly wild or deadly country, through forests that effectually obscure the view and shut out all fixed points from direct observation.

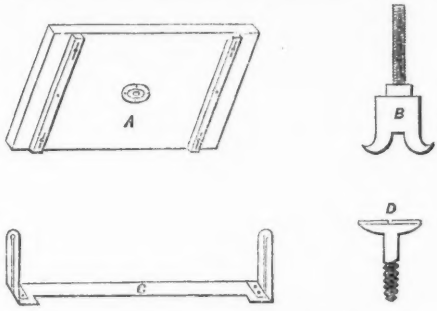
In conclusion, I must express my sense of having dealt very inadequately with a subject of exceeding difficulty. This difficulty lies in so balancing the merits of different systems, which must in all possible circumstances of application vary as infinitely in the conditions under which they are applied, as one part of the earth's surface in all its physical and human relations varies from another, as to strike evenly between them and point out conclusively that one is better than another. Nor should I have attempted it but for the one great fact of the perfect unanimity of scientific opinion on the subject, wherever that opinion has been based on fair trial and experience. It may be

said that in India, and on the continent of Europe, a system has been elaborated and perfected by practice, under opportunities such as have never been afforded to English surveyors out of India, and that such small amount of geographical work as has been done by them cannot be fairly taken as a test of the merits of the English system. But there is this to be noted, that in India our present system is but the riper and, as we are pleased to believe, more perfect outgrowth of the older one. The old military maps of India of from twenty-five to forty years ago were constructed as the maps in Syria have been constructed lately. Those old military maps are no small source of grief to us even now, and yet they were completed by most able and scientific men. But with increased and wider experience and the application of much thought to the subject, we have arrived at the point of adopting the system of plane tabling until it forms the very backbone of our work in every field, and has established itself in the good opinion of our scientific topographers to an extent that could hardly have been foreseen even by Colonel Robinson when he introduced it. His own views of the subject will be found in an excellent appendix to General Thuillier's "Manual of Surveying for India."[1] Now, if we are not all wrong in our conclusions, and if it is true that as in certain directions we claim that the plane table affords the *only* means of meeting the requirements of the day, so in other directions, we, in common with the scientific surveyors of all Europe, are right in assuming that it is the *best* means, does it not follow that a general knowledge of the use of the plane table would be a great advantage gained by our military men? Is it quite satisfactory that when topographical maps of a large extent are suddenly required under urgent conditions of military importance, that the strain of this, the hardest work that any military man can engage in, should fall entirely on the back of the already overstrained Survey Department? I am not at all unaware of the valuable work executed by the Officers of the Quartermaster-General's Department, but why should not their scientific capabilities be stretched a good deal further in this direction?

The sum of all the weightiest objections urged against the plane table that I have as yet heard may be expressed thus:—"We do not "know the use of it." It is an objection most easily overcome; the time occupied in learning the use of it is so short—that which is to be learned is so simple—the expense of the instrument is so small—that surely it could be taught in our schools and academies as well as the usually adopted methods of military map making without detriment to any them. This, at any rate, would be the beginning which promises best to overcome the well-known *vis inertiæ* of long established habit and custom, and to give plane tabling a fair start among English military map makers.

[1] "A Manual of Surveying for India, detailing the Mode of the Operations of the Trigonometrical, Topographical, and Revenue Surveys of India." Compiled by Colonel H. L. Thuillier, C.S.I., R.A., and Lieut.-Colonel R. Smyth, late Bengal Artillery. 1 vol. Large 8vo. Calcutta, 1875. 3rd edition. Note, for full particulars of the use of the Plane Table, see Appendix to the above work.—ED.

Description of a New Plane Table in use with the G. T. Survey.



A. Shows the under part of the plane table, with the brass socket-screw in its centre, countersunk and fixed by four screws. The board is made of planks of well-seasoned toon or deal wood, one inch thick. To prevent warping, edge-bars are attached across the grain. These edge-bars are to be fixed firmly by one screw in the middle. There is also one screw at each end, passing through a long hole, so as not to impede expansion and contraction. These latter screws should have broad heads, and should not be screwed too tight, and the shoulders should be slightly bevelled, or turned off, so as to offer the least possible resistance, as in D. Moreover, a piece of brass or tin should be placed between the shoulders of the screw and wood, to prevent counter-sinking, which would prevent the expansion and contraction of the wood. After being made up and well aired and seasoned, the surface of the board should be planed true and smooth.

B. Is the screw for fixing the table and the stand.

C. Is the sight-rule for plane table.

General Remark.—Iron is inadmissible on account of the compass.

Captain the MARQUIS DE LA FERRONNAYS, French Military Attaché: In complying with Captain Holdich's kind request, I must first of all claim your indulgence, for, when I spoke a few words the other day at Chatham, I little thought that I should have to repeat them before members of this world-renowned Institution, and I am obliged to use a language which is not my native tongue. What I said at Chatham was that the large ordnance map of France, at the scale of one to eighty thousand, was entirely surveyed by means of the plane table. Some parts were so surveyed directly and others indirectly, and for the following reasons. At first it was decided by the Committee, composed of scientific and military men, who had been appointed to study the best system for making such an extensive map, that after a network of triangles had been drawn over the country by trigonometrical and geodesical observations, the topographical survey should be made by the Officers of the *Ingenieurs Geographes Corps*, by means of the plane table. The work began on that principle in 1817, but proceeded rather slowly; the streets of Paris, Beauvais, and two or three more were prepared in this way. Two years later, an important modification was made, which had the advantage of allowing the surveys to proceed with a far greater rapidity. When the revolution at the end of the last century brought taxation to bear on all landed property, it became necessary to form a perfect parish map, where every division of property should be distinctly indicated. This map, which was on a very large scale, was made separate for each parish, and a special network of triangles was drawn over each separate "canton," so that the only community existing between these maps all over France was the scale and the process of execution, as the surveys were entirely conducted with the plane table and

the chain. In 1819 this *cadastre*, as it was and is still termed, was far from being completed for every one of the 40,000 parishes in the country, nevertheless it was decided that, wherever the *cadastre* was available, it would be made use of by the Officers of the Ordnance Survey Service as a general outline, which would only have to be completed. To enact this principle, the following regulations were made:—1. In each parish the *carte d'assemblage*, or general map of the parish, on the scale of $\frac{1}{10000}$, which opens the atlas of the parish, should have to be reduced carefully to the scale of $\frac{1}{40000}$, which has been selected for the Officers' surveys in the field; 2. Each Officer had to complete this reduced copy by means of the accurate information always gathered by the tax collector, for financial purposes; 3. Each parish map so prepared was then cut out with scissors, and pasted on a sheet of drawing paper, called *feuille minute*, on which the lines of longitude and latitude had been previously drawn, and the trigonometrical points marked. By means of a needle put through these points on the map and fixed on the corresponding points of the *feuille minute*, a perfectly regular portion was secured for every one of these parish maps, and what little survey remained to do, being merely "detail," was then surveyed with prismatic instruments. But, in fact, as the general principle adopted was the plane-table surveying, and as the *cadastral* map was surveyed by means of this most simple process, it may be said that the ordnance map of France has been entirely surveyed with the plane table. In Algeria, wherever the *cadastral* map did not exist, which was the most frequent case, and in other more or less civilised countries where we have been of late surveying without having as a basement, I might say, to our surveys, any previous accurate topographical information, it has always been the plane table we have resorted to.

Later on, in the course of the discussion, Captain de la Ferronnays said, in answer to a question put by General Crawley: The instrument is called the *boussole Houssard*. It consists of a small compass, with a mirror in the lid and a pin on the edge of its square box; the mirror is marked with a vertical scratch, and the instrument must be so held that the image of the pin falls on this scratch. Then, by turning round till the image of the point, whose magnetic direction is required, falls also on the scratch in the mirror, the needle shows the angle on a dial, and can be stopped by acting on a small spring as soon as the image of the pin and that of the point come together on the scratch in the mirror. I have always found this instrument the most convenient for observations on horseback.

Major-General Boileau, R.E., F.R.S.: Sir Lintorn Simmons and Gentlemen: It has been my good fortune, through the kindness of Captain Holdich, to have had the opportunity of perusing the admirable lecture which you have just heard, before coming into this theatre, and having given it a very careful study, I am bound to express my opinion that Captain Holdich has stated his case with such clearness, has argued it so completely, and has proved it so satisfactorily that he has bound criticism. Plane tabling is not intended by the lecturer to take the place of trigonometrical surveying, or for field measurements for assessments, or for technical engineering operations, though, as respects the former, the system is capable of great accuracy in triangulating, as well as in mapping the topographical features of a country. The system here advocated formed a part of the education, at our Military Academy, for many years, but was confined chiefly to filling in, and for this purpose it is described in a work written for use in the Royal Military College, at Sandhurst, as one of the best and most convenient instruments we have; but of late years its application has been greatly extended, and we have seen, in the maps lying on the table, that it is capable of producing, in skilful hands, maps of the most perfect and complete kind. Lectures, given in the theatre of this Institution, have not unfrequently included subjects of great value and importance in the various departments of military science, and it is to be hoped that the attention of the authorities may be drawn to the great benefit which will result by the introduction of instruction in plane tabling, in its extended application to military map-making. The instruction might be given at Woolwich, Sandhurst, and at Chatham, and should be considered as part of the course which is to qualify for appointment at examinations for commissions, and not to be learned after joining the Army and entering on a career of active service, either in India or Europe. The Quartermaster-General's and Intelligence Departments would do well to make the subject their especial study, and until the system

of plane tabling shall have been introduced as a part of the curriculum to qualify for commissions, it is most desirable that young engineers should be instructed in the use of the plane table, when they go to Roorkee, so that they might be indented for the purpose of military map making, as in the various parts of Afghanistan, through which our forces are now proceeding—a work for which the supply is furnished from the civilian members of the Survey Department of India.

Major WEBBER, R.E., said that, in spite of the last work of General Boileau, he ventured to get up and advocate the cause of the prismatic compass. It was the instrument with which most of them had been taught military topography, and much good work had been done with it all over the world. Sir William Jervois, Colonel Colley, and the younger Tylden had sketched many thousand square miles with it, during the earlier days of Cape warfare: sketches some of which he had seen. He himself had sketched with the prismatic compass, often in India, and only on one occasion, namely, on the Gwaliar Hills, had he found the least inconvenience from the influence of local magnetism. He had also instructed cadets in its use daily for five years, and could speak from experience as to its usefulness as an instrument for instructional purposes, and he believed that, in this respect, it was superior to the plane table, as its use made the learner think, observe, plot, and sketch under circumstances more analogous to the realities of service than if they had the assistance of a steady surface resting on a tripod stand. He hoped that the day was far distant when our young aspirants to the rank of Officer in the British Army would be taught military surveying with the plane table. For filling in a triangulation in a survey in which a less amount of accuracy than by chaining is required, and when the surveyors possess a low order of intelligence, the plane table finds its proper sphere. For the filling in of the Ordnance Survey its use has long been abandoned, because the far more accurate means, namely, by chaining, had been immeasurably superior. He might be permitted to explain why the plane table was so much used in France, having had an opportunity, long ago, of making enquiries, when this question was agitated in 1863. The National Survey of France had not proceeded in the same order of precedence of operations as our Ordnance Survey. In England, we had commenced with our great and minor trigonometrial triangulation, and then filled in, first for the 1-inch with less accurate means, and then quickly we had adopted the system of chaining for all the subsequent scales. In France, long before a really accurate trigonometrical survey had been made, excellent parish and commune maps, made with the plane table, existed already, and when the survey of the country was undertaken by the nation, these plane table maps were largely used for filling in the triangulations. He had no hesitation in saying that, whether on horseback or on foot, the rate of progress of making a military map depends far more on the portability of the instrument and the skill of the sketcher than on the mechanical convenience which the plane table afforded. Two skilful sketchers, mapping on the scale of, say one inch to a mile, the one with the compass the other with the plane table, each produce maps in the same time which, if compared, would not show differences greater than the breadth of a pencil line. And what more, he would ask, is required in most military maps? Any one who had learnt the art and practised it, with the prismatic compass, would be able to use the plane table for greater accuracy, with a day or two of practice, and also would have a better foundation for that higher conception of the art, called "eye-sketching," which really meant being almost, not quite, independent of observations, so little taught and practised since the days of Jarry and High Wycombe.

Mr. HADDAN, M.I.C.E., said that the lecturer had omitted the most important recommendation which could be advanced in favour of the plane table when placed in inexperienced hands, viz., that the user is able to judge to a nicety the amount of detail the scale requires. In ordinary surveying many years of practice were necessary before the surveyor knew precisely what to survey and what to leave out. In Turkey he put the instrument into the hands of inexperienced persons, and found very little to find fault with in their work. Major Webber pointed out the inconvenience of the facilities for "fudging" which the plane table certainly afforded; and to avoid this he (Mr. Haddan) procured gray-coloured enamelled cards, and which were indelibly scribed with a sharp pointer, as a substitute for the paper and pencil. These cards were also unaffected by weather, which Mr. Haddan believed was one

of the main causes of the work by plane table being given up in England, where the climate is certainly not favourable to outdoor draughtsmanship.

He thought that sufficient distinction had not been given by the lecturer to military surveying proper, as against permanent surveys conducted by military men. One required portable and approximate instruments and treatment, and the other, especially for the triangulation, called for permanent towers of observation, &c., &c., and the greatest nicety. Military surveying might, as in Turkey, consist of diagrams showing the number of hours' march between each point,[1] while map making proper required all the distances plotted as the crow flies, and not as the soldier marches.

For obtaining angles for triangulation purposes with the greatest nicety, and with a small instrument, Mr. Haddan has invented what might be termed a time theodolite, in which the telescope revolved by clockwork. One revolution might be an hour, a day, a week, or a month, according to the acuteness of the angles or the amount of accuracy required. The number of beats of the pendulum balance during one complete revolution gave the divisions of the circle to a degree of perfection impossible in the largest or most accurately divided vernier theodolite.

Major-General CRAWLEY: Sir Lintorn Simmons, I trust I may be permitted to express the very great surprise I feel at some of the statements made by Captain Holdich, in the very able and interesting lecture he has just delivered before this meeting. I am indeed astonished to learn that surveying with the plane table "an "instrument so familiar to us in India, and to every Continental surveyor" is yet "one of which the scientific use is utterly unknown in England." The gallant lecturer, further on, speaking of the expedition to Abyssinia under Lord Napier of Magdala, says, "English military expeditions sometimes . . . enter upon a "corner of the earth's surface . . . guiltless of anything in the shape of exact "measurement, or of an initial base, with an abstract value in latitude or longitude. "Opportunities of acquiring geographical information under such circumstances are "rare, but that such opportunities should be seized for the value they may subsequently prove to possess, is, I think, exemplified in the case of the Abyssinian "Expedition." He then proceeds to describe the results of the Abyssinian Survey, which, as he says, ended in producing a very good skeleton of a map, but nothing more, "which, when completed, would convey no notion of the nature of the country "traversed, &c.;" and he adds, "one cannot but look back with regret on the good "opportunities presented . . . for the further acquisition of geographical maps, "had there been more than two Officers with the force acquainted with the use of "the plane table."

Now, sir, it is forty odd years ago since I was a cadet at the Royal Military College at Sandhurst, and it was then the rule that every cadet, as soon as he had acquired the art of delineating the features of ground according to the horizontal method, was placed in the surveying class, under Professor Burr. The classes were formed at the beginning of each half-year, and the course of instruction was commenced with a five-inch theodolite and chain, with "offsetting" staff, going through the whole of the operations of a regular survey of the Hartford Bridge Flats, or the Easthampstead Plain, within a few miles west and north-east of the College. A series of triangulations were made with the theodolite, and the roads surveyed with the theodolite and chain, and the bearings, angles, and distances measured recorded in our field books, whence they were protracted, plotted, and laid down on paper in the Hall of Study, under the superintendence and instruction of Mr. Burr. These skeleton surveys were then transferred carefully to our plane tables, and we were then taken out again, and instructed in the mode of filling in the "skeletons" with the contours of the hills, the hedges, and enclosures, and all the minor details of footpaths, byeways, rivers, and watercourses, &c., &c., forming when completed a *map*, more or less accurate, according to the care and attention bestowed on it by the pupil. This instruction was conducted by Mr. Burr in classes of eight, ten, or

[1] The sun being nearly always visible, and Mussulmans being able to judge time by the sun, and direction by the position of Mecca, even common soldiers are sent as scouts on either side of the line of march, and from their observations very correct diagrams are made. The scale of measurement is two miles an hour, the universal caravan standard of speed.

twelve cadets, twice or three times a week, according to the numbers he had to instruct, and lasted generally for the whole of the first half-year. In the second half-year each cadet considered qualified was furnished with a plane table for his own use, and a tract of country was assigned to him by Mr. Burr, of which he was required to bring in a survey to the best of his ability, and thus almost every cadet who passed through Sandhurst College in those days—certainly every cadet who aspired to obtain his commission—was fully acquainted with the use of the plane table, for this knowledge was an indispensable qualification for a commission.

For these reasons, sir, I am at a loss to understand how it can be said that the "scientific use of the plane table is utterly unknown in England," nor am I able to realise how in the large force which invaded Abyssinia under Lord Napier, there was only one *surveyor* (the gallant lecturer himself) capable of conducting geodetical operations of any magnitude, and that "only *two Officers* of the whole force were "acquainted with the use of the plane table;" and that those two, as Captain Holdich afterwards informed the meeting, were so imperfectly instructed in it, as to render their assistance almost, or wholly, valueless to him. With the knowledge I possess of the system pursued at Sandhurst, as before detailed, and which I should suppose was equally, if not in a superior degree, pursued at Woolwich Academy, in the education of the "scientific corps," I should imagine that *hundreds* of Officers in such a large force *ought* to have been found, not only acquainted with the scientific use of the plane table, but even capable of conducting geodetical operations, to have ensured a good and reliable map of the country and of the operations of the campaign.

Lieutenant-Colonel Godwin Austen: Having served for many years on the Staff of the Indian Survey, I have listened with great interest to Captain Holdich, and first with reference to what fell from the last speaker, Major-General Crawley, I may state that I was first initiated into the use of the plane table at the Royal Military College, Sandhurst. At that time (1851), all cadets were put through a course of instruction in surveying, of which sketching ground with the plane table on a scale of about six inches to the mile formed the principal part of the course, which was then an excellent one. Captain Holdich alluded to the frontier surveys of India. No better example exists of how useful facility, in working with plane table can be, than is exhibited on the map hanging before us, in the portion of the Kurum valley on the Peshawur frontier from Thull upwards. In 1853–54 the survey of Kashmir territory, under Captain Montgomerie, had commenced; and it was then decided, in order to give young Officers of the Quartermaster-General's Department a knowledge of surveying, to attach some of them to that survey party to fill in the topography. Lieutenants P. S. Lumsden, Allgood, and Johnstone were selected, and worked under Captain Montgomerie for a whole summer. When an expedition into the Kurum valley took place in 1855–56, Lumsden, then Deputy-Assistant Quartermaster-General at Peshawur, accompanied it, and together with Lieutenant Garnett, Bengal Engineers, made an excellent plane table sketch of the whole valley on half an inch to the mile scale, which must now be of the greatest value to General Roberts and his column advancing up the valley to the pass at its head, the Paiwar Kothul. This excellent system was, unfortunately, not carried on by subsequent Commanders-in-Chief;[1] but it shows how advantageous it is that all young Officers of the Quartermaster-General's Department should be trained in the use of the plane table.

Captain G. E. Grover, R.E.: Though impressed in favour of the "plane table,"

[1] Note.—I did not add, but may now mention, that this system of employing regimental Officers on the survey led to the appointment of three other Officers in 1857, viz., Lieutenants Melville, Murray, and myself, to the Kashmir survey. The fair copy and compilation of Lumsden and Garnett's plane table work fell to me, then in the 24th Foot, and Aide-de-Camp to Major-General T. Reed, commanding the Peshawur Division. I always attribute my career since then in the trigonometrical and topographical survey of India to the excellent system of surveying and instruction in military drawing, that I went through at the Royal Military College, of which the use of the plane table formed a large practical part.

as a surveying instrument, by what we have heard here to-day, I have been begged by the lecturer to say all that I can against it. I will, therefore, in the *rôle* of "devil's advocate," urge some possible objections to the use of the "plane table" for all military purposes, and I will do so in the form of questions. 1st. How does Captain Holdich reconcile his eloquent regrets at the loss of "golden opportunities" during his survey operations in Abyssinia, because not more than two Officers with the "force were acquainted with the use of the plane table" (page 991), with his subsequent assertion that "the time occupied in learning the use of it is so short—"that which is to be learned is so simple?" (page 994). The use of the much-abused prismatic compass can be taught to Officers in a very short time. 2nd. Is not the plane table (with its tripod stand), compared with the prismatic compass, cumbrous, heavy, and awkward for a reconnoitring Officer to carry with him on horseback? 3rd. If the prismatic compass were altogether superseded by the plane table, how could secret reconnaisances be carried out? No Officer could possibly use so bulky an instrument when engaged on secret surveys; and such duties are frequently required of Officers in Europe since, even in one's own country, it is often unadvisable to let the public know that military Officers are examining and surveying certain localities.

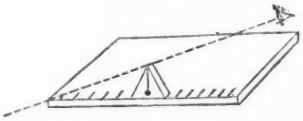
General BOILEAU: With the Chairman's permission I will reply to the remarks of Major Webber. If the system of surveying by compass and chain were as perfect in practice as it is in theory, it would be a good system; but it is subject to so many sources of error, that compared with plane tabling it must be considered as imperfect. It is liable to errors in the angles and distances in the field work, and to those of protraction in drawing the map; and if the work does not close accurately, the discovery of the place where the error has been committed is next to impossible. The safest way of proceeding in the protraction of route surveys is given in my "Traverse Tables," but even by the method there pointed out, the errors of the field work are not, indeed cannot, by any means short of going over the work again, be eliminated. I believe that by the introduction of plane tabling, the chain and compass system will receive its *coup de grâce*, and although for approximate purposes it may receive occasional use for the purposes of correct and extensive map making, it may be considered as good as dead and buried.

Lieutenant WATSON said he thought it was a good proof of the advantages of the plane table, that he had never known anyone, after becoming accustomed to its use, abandon it in favour of the compass and sketching case. Its simplicity was a great advantage, and he could not agree with Major Webber, that the compass was preferable because its use required more intelligence on the part of the person sketching with it. The plane table was really quite a portable instrument, and probably one Officer, with a labourer to carry the table, could do as much work, and certainly more accurate work, than two men using the prismatic compass and sketching case.

Major FRASER, R.E.: Even had Captain Holdich been less successful in proving the value of the plane table, the fact that it is so largely used in India, is alone sufficient to make it desirable that the Engineer Officers at Chatham should all understand its use, because comparatively a large percentage of them may have to employ it in India, or may find it convenient to do so elsewhere. There can hardly be a difference of opinion as to the superiority of the instrument over the compass where it *is* convenient to use it, as is almost always the case in surveying as distinct from reconnaissance; but I disagree with the opinion that it can entirely replace the smaller instrument. I happen lately to have been employed in military sketching, under the conditions of active service, and I do not hesitate to say, that it would have been impossible for me to have done what I did with the plane table or without the compass. We have the misfortune to live at a time when every one has to learn too much, and the British cadet is, on this head, one of the most suffering of his kind. I think we may assume, that of the 200 to 300 cadets, other than engineers, who annually pass out of Woolwich or Sandhurst, not more than four or five per cent. are afterwards required to use the plane table; while, I venture to say, a much larger number may, on active service, have to use the compass as being the more portable and more generally available. It does not, therefore, seem desirable to inflict a new subject on 95 per cent. for the sake of 5.

It may be of interest to remind the meeting, that the French Military Survey of the Gallipoli Peninsula, the accuracy and excellence of which some of us have had recent opportunities of testing, was done with the plane table.

Captain STRAHAN, R.E.: As I have been employed on the Indian Topographical Survey for the last fifteen or sixteen years, and have used the plane table during that time in many different kinds of country, and on scales varying from ¼ inch to 24 inches to a mile, I should like to add my testimony to that of Captain Holdich, as to the facility, accuracy, and rapidity with which a survey can be carried out with that instrument. There are various little additions to the simple plane table which I have had occasion to use, and which may, for certain purposes, considerably add to its utility. For instance, it is sometimes desirable to know at what angle the ground on which you are working slopes. For this purpose I have had made, of thin wood or of sheet brass, a small equilateral triangle, about 3 inches high, with a little plummet hanging in a groove down its face, very similar in fact to a miniature mason's level. To measure the angle of a slope the triangle is made to stand up on its base (being held by the hand of the observer) and then, the board having been ascertained to be as truly level as possible by means of the plummet, the triangle is moved backwards or forwards on the table, until a straight line from the observer's eye through the vertex of the triangle and the further edge of the board is seen to be parallel to the slope. A properly prepared scale, on which the triangle stands, then shows the angle of the slope. This scale is merely a scale of co-tangents to a radius equal to the height of the triangle. (The following diagram was here shown on the board to elucidate this matter.) In large scale maps



made with the plane table it occasionally happens that it is necessary to use chain measurements; I have, therefore, added to the scale of co-tangents just mentioned, a scale showing the number of links to be subtracted in chaining on ordinary slopes, and which is used with the triangle in the same manner as the former one. This was found to be exceedingly useful in the survey of Simla, which stands almost entirely on steep hill sides, and where the scale was so large (24 inches to a mile) that a considerable quantity of chain measurement was necessary. The map of Simla referred to is laid on the table before you for inspection. Another simple and useful addition to the plane table is a small sun-dial. This consists merely of a piece of sheet brass cut into a gnomon, with an angle suitable to the latitude of the survey and standing on a brass foot. A dial is drawn on the plane table by any of the methods well known to surveyors, and when the table is adjusted in azimuth, the gnomon by its shadow serves to give the apparent time within a very few minutes. Now, although it does not seem to be a very important thing thus to determine the time, yet the converse problem, viz., having given the time, to determine the board's position in azimuth, is by no means so unimportant, for, by this contrivance, we can set the table up very approximately without a compass at all, using only the rough sun-dial just described, if we possess a fairly good watch showing nearly apparent time. Other contrivances of the kind will certainly occur to workers with the plane table as they may be wanted, and I have merely mentioned these two at this meeting, to show that the instrument is not so limited in its powers as some suppose it to be. For most purposes, both of military reconnaissance and of accurate surveying also, I consider the instrument as unrivalled.

Captain HOLDICH: In reply to the objections that have been urged by Major Webber against the use of the plane table, as applied to ordnance or cadastral surveys, I would point out that I have always endeavoured to make it clear that it is neither for ordnance nor cadastral surveys that its use has ever been advocated by me. I should like very much indeed to see the maps of the Cape Survey referred

to by Major Webber, although final maps can never be accepted as particularly good evidence in support of the system under which they are constructed. The plane table system, as it came under Major Webber's observation in India, was evidently very different indeed to anything that is carried on now in that country, and if Major Webber will take the trouble to reckon up the number of square miles of geographical work turned out in these days by the plane table system in India, he will find that the "partial" (or "limited") application of it, which he admits would be advantageous, altogether outweighs that of all other geographical survey systems put together. Captain Grover has asked, first, how it is that if plane tabling is so easily taught, opportunities were missed in Abyssinia which might have been utilized had there been more than two Officers with the force acquainted with the use of the plane table. I can only say again, from experience, that it is impossible to teach the system (simple as it is) when the pressure of campaigning is actually in force. He next asks whether the plane table can be carried on horseback. It certainly can, as readily as either a rifle or a spear, as you may convince yourself by lifting up the plane table here exhibited. But it is necessary to dismount to work it. If work in the saddle is referred to, then there is a useful little French instrument which seems better adapted to rough reconnaissance than anything we have in England. (The Marquis de la Ferronnays here explained, in answer to an enquiry, that the instrument was called the *boussole Houssard*, and showed how it was made use of by mounted Officers.) Again, Captain Grover remarked that the plane table was not adapted to *secret* work. It certainly is not—nor has its use been advocated for such work. This gives me the opportunity of referring to a class of survey in which the plane table has no place, which is carried on in India by trained natives, under various disguises, beyond our frontier; a reference to which was omitted from the lecture for want of time. There is no more interesting branch of our Indian survey work than this, and its importance has been recognized by the Royal Geographical Society, by the bestowal of its highest award (the Gold Medal of the Society) on the well-known native explorer, Pundit Nain Singh, of Kumaon. In reply to Captain Fraser, who is prepared to admit the advantage of plane tabling instruction at Chatham to our Royal Engineer Officers, but does not see the value of its further extension, I would point out that there is a very large survey in India, called the Revenue Survey, which is conducted entirely by Officers who are *not* Engineers: and that even in this survey the plane table has a modified place. Nor does the fact to which he refers, that so little time is given to instruction in surveying at Woolwich, much affect the question. If it is but one day's instruction out of the 365 of the year, it would be well to teach whatever may be proved to be the *best* system during that one day. Major Webber remarked that the compass error was comparatively inappreciable. I have taken some trouble to show that the resultant error of using the compass and protractor *may* amount to at least one degree. Now, one degree of error becomes appreciable at a *very* short distance indeed. Under no scale of survey could it well be called inappreciable.

General Sir LINTORN SIMMONS, in conclusion, said much as follows: From what has been said in the discussion, it seems to me that there are circumstances, such, for instance, as the necessity for secrecy in work, that would prohibit the use of the plane table. I have myself, in a survey in North America, been obliged often to climb up a tree to recognize points which I could not otherwise see. I do not quite see how the plane table would meet this difficulty either. But by far the weightiest objection that might be brought forward seems to arise out of the observations that have been made, to the effect that plane tabling was once taught in our military schools and was abandoned. There must have been very good reasons for giving up instruction in its use. I am myself in favour of instruction in sketching by eye, without the use of any instruments at all, for the construction of military reconnaissances and maps of position; but still I quite agree that the plane table system may have a valuable application, where wide maps are required of a country which has already been secured by an advancing force. Under such circumstances I think the system would be a very good one indeed. But, whatever we may think about it, I am sure we shall agree in thanking Captain Holdich for his lecture.

LECTURE.

Friday, December 6th, 1878.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., F.R.S., in the Chair.

AFGHANISTAN AND THE MILITARY OPERATIONS THEREIN.

By Lieutenant-General J. L. VAUGHAN, C.B.[1]

AFGHANISTAN is a country which must always possess the deepest interest for Englishmen, no less from its past than from its present history, and because it is only through its historical mountains and passes that an invading army is likely to threaten British India. If we think of its past history, our minds recur to the now triumphant, now disastrous, and yet again triumphant episodes in our military annals, of which it has been the scene. We conjure up again in our mind's eye the march of that great unwieldy column, which wended its laborious march through the defiles of the Bolan and the Khojuck, under Sir John Keane; which staggered into Candahar with an almost exhausted commissariat, and which, refreshed and reorganized, again resumed its painful march on Caubul, halting to reduce, by a brilliant and almost untried device of war, the supposed impregnable stronghold of Ghuznee. We see our comrades of the last generation of Officers settling themselves down in treacherous quietude to the routine of ordinary cantonment life in the straggling cantonment at Caubul, or preparing to endure the hardships of the approaching winter in the recesses of the Hindoo Kush. We hear the whisper of the gathering storm which was presently to wreck a British Army in the passes between Caubul and Jellalabad: we see the body of our murdered envoy exposed, mutilated, and headless in the great Bazar of Caubul: and the corpses of 800 British soldiers lying stark and bloody on the snow of the Khoord Caubul, and Jugdulluk Passes. Then, again, changing the field of vision, we see the "illustrious "garrison" sallying forth after its five months' beleaguerment, and dispersing to the winds the boastful besiegers; and Nott, calm and

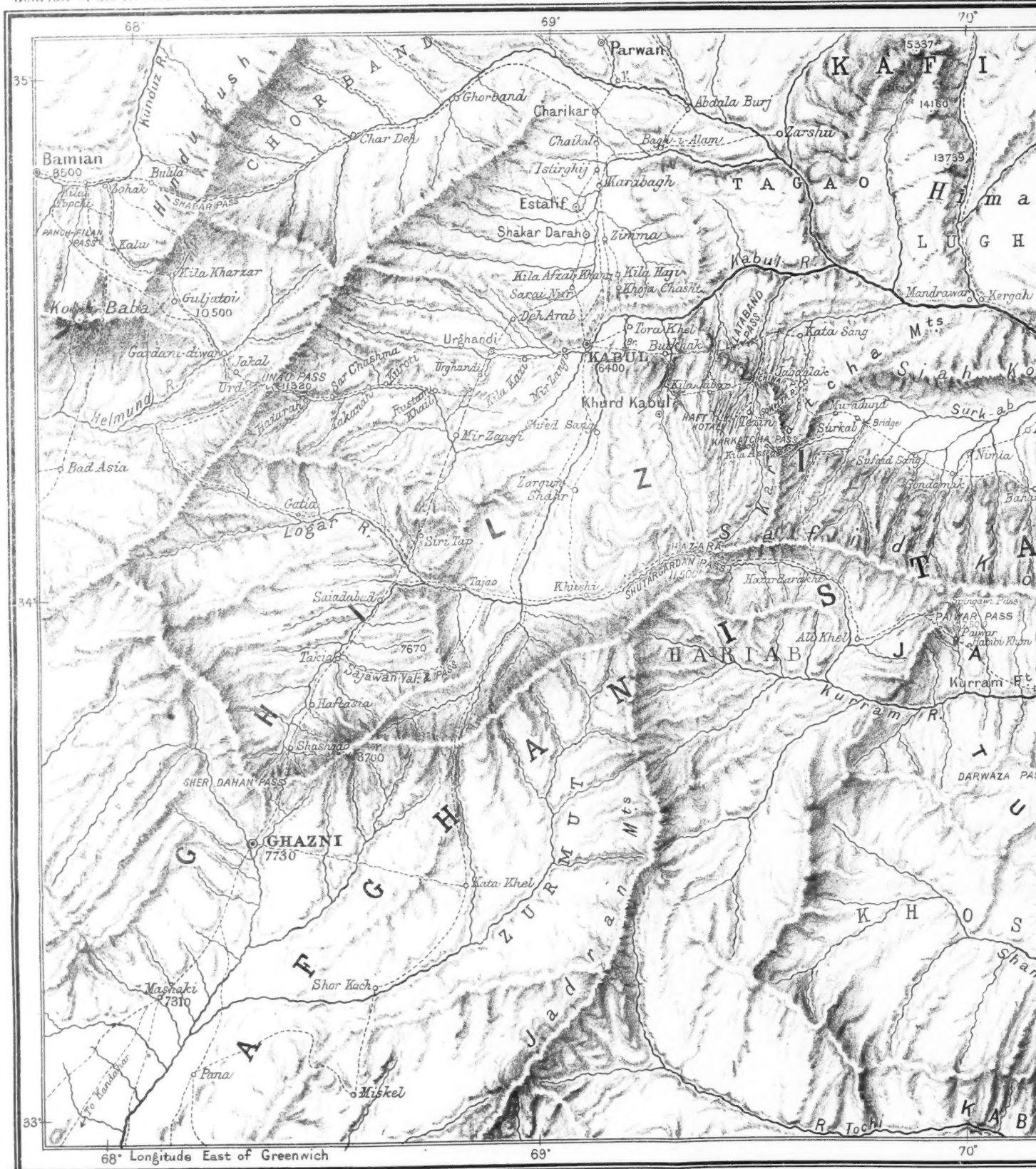
[1] Read in General Vaughan's absence by Colonel G. B. Malleson, C.S.I.

resolute at the head of his "beautiful regiments," maintaining himself with never-failing courage within the feeble walls of Candahar. Once more, and we see two British Armies, in all the confidence of strength and victory, converging upon the capital, the scene of disgrace, little familiar, thank God, to British soldiers; we see the British colours once more floating on the Bala-Hissar, and we reflect with pride, tempered with the modesty which our previous reverses inspire, that, at least, something has been achieved as a set-off against our great disasters.

And now the "whirligig of time" has brought about that we are again to be brought into fresh and hostile relations with Afghanistan, and that the twice-forced defile of the Khyber is again to be trodden by British troops. It has seemed, therefore, to the Council of this Institution, to be proper that an attempt should be made to place before its members, and in some degree before the public generally, such information, in a succinct form, as may be available on the subject of Afghanistan, and such facts as may serve to instruct public opinion as to the nature of the difficulties our Generals and troops will have to encounter, and the best and most likely means which may seem available to overcome them.

It is right that I should, at the outset, remind you that it does not come within the scope of lectures given at this Institution, to discuss matters from a political point of view. No doubt we all have our own opinion as to the wisdom or otherwise of the policy which has been pursued of late years towards the rulers of Afghanistan, and the manner in which possible, and as the event has shown, very near contingencies, have been dealt with. No doubt in this assemblage many are of opinion that too long continued indifference to the course of Afghan inclination and foreign ambition has landed us in difficulties, the magnitude of which all thoughtful men perceive. Others again, perhaps a minority, will think that if the indifference to which I refer had only been persevered in, the present state of things would not have arisen. Both sides of the question may be, as indeed all readers of the daily journals know, supported by very strong arguments; and a gallant army of authorities stands arrayed and ready to do battle on either side. With all this, I say, I have nothing to do. I deal simply with events and facts as they confront us this day, and remit to our statesmen and politicians of whatever shade of opinion, the discussion of what might and ought to have been.

Afghanistan, as presented to us in our most recent maps, may be described as a square block of country lying between the 61st and 71st degrees of east longitude, and the 30th and 37th of north latitude. It is bounded on the north by Bokhara and the still independent portion of Turkestan—it would hardly be wrong perhaps to say by Russia. Persia adjoins it to the west: the conglomeration of small States, known as Beloochistan, to the south; and British India to the east. To an audience like this, who may be presumed to know as much on the subject as the lecturer, it would be impertinent to enter into any very minute description of the country. So much I may say, that it is useful to regard Afghanistan as divided into two parts—a northern



68° Longitude East of Greenwich

STANFORD'S GEOGRAPHICAL ESTABLISHMENT.

and a southern—a division indicated indeed by nature in the existence of a strongly defined watershed, commencing at the eastern extremity of the Safaid Koh Mountains, and extending westward in their somewhat irregular prolongation at diminished elevation through the high table-land of Ghuznee. In this watershed the principal rivers of Afghanistan take their rise—notably the Caubul river, which flows northward to the capital, and thence eastward to the Peshawur Valley; and the Helmund, which flows south in the direction of Candahar. Northern Afghanistan is a country of high, rugged, and often pine-clad mountains, and deep glens. Southern Afghanistan, on the contrary, abounds in stony, undulating, treeless, and almost desert plains, dotted here and there with oases of cultivation, particularly along the course of its rivers and streams. Such is, I believe, a fair general description of the physical aspect of Afghanistan. To the better understanding of it, it seems to me very desirable to study the most recent map I know of—that by Mr. Trelawny Saunders, given in the last number of the "Geographical Magazine." In this map, the Safaid Koh is very clearly and, I doubt not, accurately drawn; and the influence of the range upon the physical features of the country north and south of it is very clearly seen. Its principal bearing upon the approaching campaign is, that it separates, as by a wall, the valley of the Caubul river, that in which Jellalabad is, and through which runs the road from Jellalabad to Caubul, which will be followed by the Peshawur column, from the valley and road of the Kurrum river, which it is apparently intended should be used by the small column, the base of which is Thull, and, more remotely, Kohat. The Safaid Koh range, the direction of which is due east and west, throws out, as will be seen by the map, an infinity of small spurs both to the north and south. These northern spurs extend a considerable distance into the plain of Jellalabad; and it is some of these spurs, but at the eastern end of the range, which make that confused complication of mountains, known as the Khyber Hills, and which are pierced by the Khyber Pass. The spurs thrown out by the Safaid Koh to the south are apparently fewer and less regular; but one very marked and important spur is that which gives its name to the Paiwar Kotul (*Anglicé* "steep ascent"), and which is a serious obstacle to a force advancing up the Kurrum Valley. It is here that General Roberts' column, if it is to be advanced so far, will probably meet its first serious opposition.

I think it is proper here to draw your particular attention to the great mountain barrier which shuts in Afghanistan to the east, and through which a passage has to be sought whether to or from Afghanistan. Though it is usual to consider this barrier as forming part of what we know as Afghanistan, it must be understood that the tribes who occupy the outer or eastern face of the barrier owe, with few exceptions, no allegiance to the present ruler of Afghanistan, and are entirely independent of him. The Momunds, the Afreedees, the Oorukzyes, the Zwymukhts, the Wazeerees, to name a few of the principal tribes of those referred to, are strictly independent. We must deal with them on this footing, and either pay them or force them to

give our troops a passage to Afghanistan. It is not till we have pierced through this outer barrier of independent mountaineers that we enter upon the subjugation of Afghanistan itself. In the name of humanity, and in view to circumscribe as far as possible the circle of those to whom fire and sword must be carried to obtain our object in setting our armies in motion against the Ameer of Caubul, let us hope that our political officers will use their best endeavoursto obtain by conciliation and payments the right to use the roads through the passes up to the point where they cease to belong to the independent tribes.

To complete this short notice of what I have called the great eastern barrier of Afghanistan it will be convenient to call your further attention in this place to the more southern portion of the barrier. In this direction the barrier is formed by the great Soleyman range of mountains and the tribes which occupy it. Geographers are not yet quite agreed, I believe, as to where the northern end of this great north and south range is to be placed. Some consider it as joining almost at right angles the Safaid Koh, in the neighbourhood of the Shuturgurdun Pass, and thence as forming the watershed between the Helmund and the Indus valleys. I think, however, we may leave this question to be discussed by the professional geographers, and be content to say that the great range of hills, call it by what name you will, which extends from the Safaid Koh to Scinde, and divides the affluents of the Helmund from those of the Indus, gives shelter to a number of independent tribes, Pathan in its upper, Belooch in its lower course. And further, let it be borne in mind that these independent tribes will play a most important part in the account, whenever we have to deal with Afghanistan proper.

The great eastern mountain barrier of Afghanistan, of which I have been speaking, and which I should remark extends from the Hindoo Kush, on the north, to Scinde and the latitude of Quettah, in the south, is, of course, pierced by many defiles, serving the purpose of passes or roads. Of these, the best known, as being the most frequented, is the Khyber, which gives the best communication between India and Caubul, the capital of Afghanistan. The Khyber hills are—as I have already incidentally remarked—a tangled web of subordinate mountains thrown off from the eastern end of the great Safaid Koh range, and filling up the angle formed by the Caubul river and the western boundary of the Peshawur valley. It will, perhaps, present to your minds a clearer view of these mountains, which are so interesting to us at the present moment, if I say that, from the eastern end of the Safaid Koh, which I place about 20 miles west of Jamrood, a strong spur is thrown off in a north-easterly direction, ending, after a course of about 20 miles, at the Caubul river. That river, in order to get round this spur in its course to the Peshawur valley, is here forced to make a wide semicircular bend to the north. You will see two prominent peaks shown in this ridge—one, 4,500 feet; and one, in which the ridge terminates, 3,300 feet. Crossing this great spur at right angles is a lesser ridge, which throws out numerous spurs north and south. The southern spurs interlace and mingle with spurs thrown out to the north by a low ridge which may be taken

as an extension eastward, at a decreased elevation, of the Safaid Koh. Between these interlacing spurs a torrent bed has been formed, which drains this small system of hills into the Peshawur valley, and which forms the roadway of the Khyber Pass. This roadway, after a course of some 20 miles from Jamrood, climbs up the main ridge thrown out from the Safaid Koh, which, with an elevation of about 3,300 feet, may be considered to form a minor watershed between the valleys of Peshawur and Jellalabad. It is in the ascent and descent of this watershed that the principal impediment to the free passage of the Khyber by an army is to be found.

You will, I think, expect from me a short description of the road through the Khyber defile, in addition to what I have said above as to the conformation and general lie of the hills through which it conducts. There are two mouths or approaches to the main defile from the Peshawur side, known in the un-euphonious dialect of the country as the Jabaghee and the Shadi Bagiar respectively. The first is, I believe, the true mouth, and that through which the drainage of the pass finds its principal exit. The two roads unite a little south of the fort of Ali Masjid. It may, I think, be taken as certain, from the experience we have had of the passes in the former Afghan war, that any of the flanking hills which it is essential to the safety of the troops or convoy moving by either of the two roads should be crowned, *can* be crowned, even in the face of a resolute enemy, by a determined and active infantry. Wade, when he forced the pass in 1839, at the head of a motley force, the most reliable portion of which consisted of four companies of British Sepoys, and the bulk of which consisted of raw levies and inferior troops of the Sikh Army, pressed unwillingly to aid in an operation which they disliked and dreaded, used the main or Jabaghee road for his principal column, and the Shadi Bagiar for a subordinate weak column under Lieutenant Mackeson. Pollock, on the contrary, used the Shadi Bagiar route for his main column, and sent his Sikh allies by the Jabaghee. Wade's operations were slow and cautious in the extreme, and he reached Ali Masjid in four days, sharply but fitfully opposed, as his loss (22 killed and 158 wounded) showed. Pollock pushed forward with the confidence begot of conscious strength, and with the high inducement of rescuing the Jellalabad garrison from a situation of great danger, and he reached Ali Masjid the same day, with a loss of 14 killed and 114 wounded. When a portion of Wade's brigade was pushed forward to succour the weak garrison of Ali Masjid, it was by the Shadi Bagiar route that it moved, and it was by the same route that Moseley, a few days later, fought his way back to Jamrood. In the first of these occasions Ali Masjid was reached by a night surprise, and it was unnecessary to crown the heights; on the second, Moseley, with two weak and demoralized regiments, had not sufficient men to crown them efficiently, and he suffered accordingly.

The fort of Ali Masjid stands upon an isolated hill in the centre of the pass. Wade described it as 150 feet long by 60 wide, and built upon an angle of the hill, the whole of which seems to have been formerly well fortified. Moseley, two years and a half later, described

it as consisting of two small forts, which are connected by a weak and dilapidated wall. He adds, that it is commanded by two hills of considerable height, of which one is to its south, the other to its west. This last fact is the really only important one, because the fort which our troops knew so well, in the last Afghan war, was blown up by General Nott, before he left the Khyber. It has doubtless been since rebuilt in the ordinary unscientific Afghan way, and will, as a matter of course, be evacuated by its garrison as soon as the advance of our Peshawur column is sufficiently developed to make its defenders apprehensive of being cut off.

The first 3 miles beyond Ali Masjid are some of the worst of the pass, the road lying down the bed of the torrent, and often contracting to a breadth of 40 or 50 feet. At 3 miles a valley $1\frac{1}{2}$ miles broad is reached, through which the road runs for 6 miles. From this valley the road ascends gradually for 3 miles to the summit of the pass, and is then carried down a most abrupt and difficult descent for 2 miles to the village of Landikhana. In a part of this descent the rock rises sheer on one side, whilst a precipice gapes on the other, the breadth of the roadway being only about 12 feet. There are still 7 miles of pass before the western exit is reached, but the character of the road becomes easier. One and a half miles beyond the western exit of the pass is the village of Dakka, on the bank of the Caubul River, at which place the Khyber is considered to end, and which seems likely to become the position of a British fort. The approximate total length of the pass is 30 or 33 miles according as the Shadi Bagiar or the Jabaghee route is used for approaching Ali Masjid.

The experience we gained of the Khyber and other passes during the British occupation of Afghanistan, and our subsequent enlarged experience in hill warfare as derived from the numerous expeditions which have been undertaken on the north-west frontier since 1850, all tend to establish the conclusion that when the simple precaution is taken of crowning all heights commanding a mountain road before the main column and baggage is permitted to enter upon it, the most difficult country may be passed through by troops without fear of disaster. At first sight the condition of safety above stated appears difficult. It may even be supposed often to be impossible to push an enemy off and occupy a mountain which is held with any resolution, and which has probably been strengthened by breastworks. In practice, however, it has always been found that, thanks partly to some peculiarity in the character of the hill tribes, and partly to the moral superiority which always seems to rest on the side of the attacking party, there are few hills so steep that disciplined and trained infantry, well led, cannot ascend and clear of undisciplined defenders. This has been shown by all previous experience to be particularly true of the Khyber hills, the defenders of which could not even stop the raw levies and half-trained Sikh auxiliaries which Wade used against them, far less the excellent troops which Pollock disposed of. I have alluded to a certain peculiarity in the character of the hill tribes. It is this: like most Mahommedans, they are naturally brave and indifferent to death, and indeed are capable of very brilliant spurts of bravery, though these

are generally shown either when they find themselves very superior in numbers, or when they see their enemy at some temporary disadvantage. But when resolutely attacked, they rarely hold their ground with any tenacity, and are always anxious about their rear; indeed, when we call to mind the ease with which Wade, with about 10,000 most indifferent troops and hardly a half-dozen of English officers, and Pollock, with inferior numbers, though a far better class of soldiers, overcame the resistance of the Khyber tribes, it is permissible to doubt whether we are not erring on the side of over-caution when we contemplate the enormous array of admirable troops now being collected under Generals Browne and Maude for the invasion of the Khyber Pass.

It may be permissible to me to pause here for a moment to notice the remarkable and apparently permanent effect which the Caubul disasters of 1841 have had upon the minds of the English in India, and how the caution inspired by them has coloured all our subsequent military operations in at least the Indian frontier mountains.

No one who is at all read in the non-official records of our occupation of Afghanistan can fail to have been struck with the wonderful confidence in themselves and their men which the Officers of that period exhibited in all the minor operations of the war; and the indifference with which they viewed alike difficulties of country and superior numbers of the enemy. The personal narrative by Lieutenant Barr of Wade's proceedings in the Khyber Pass is one illustration of this. Another is the narrative of the proceedings of a small mixed force sent from Caubul to winter in the Bamean Valley beyond the Hindoo Kush, and which, after several daring little enterprises in that remote and little known corner of Afghanistan, subsequently pushed forward a weak detachment and occupied the fort of Bajgah, far in advance of Bamean. Another instance is the fearless way in which a small force, in, I think, 1839, perambulated the Murrie and Boogta hills under Major Billamore, of which I remember reading a most interesting little narrative called "The First Campaign in the Cutchee "Hills," by the late General John Jacob, who was present.

Lastly, I would adduce, as an instance of the self-confidence referred to, the way in which Lieutenant Broadfoot, in 1839, trusted himself to the protection of a Kafila of the Povindah merchants, and marched with it from the neighbourhood of Ghuznee to Dera Ismail Khan, through the heart of the Wuzeeree hills. We are, perhaps, better without this superabundant confidence, and the more cautious line of conduct which is now the rule may be on the whole preferable; but it certainly affords a most remarkable contrast to the tone of feeling which preceded it.

I must now ask your indulgence whilst I put before you such information as I think will be interesting regarding another entrance to Afghanistan from the eastward. I refer to what is known as the Kurrum valley route to Caubul, now being traversed by the force under General Roberts.

The approach to Afghanistan by the Kurrum valley differs from all the other approaches from the east in that it does not carry us through

a thick belt of independent mountains. On the contrary, an insignificant river is all that has to be passed before our troops find themselves standing in Afghan ground. A glance at the map will show you that the Kurrum River, after taking its rise in some of the more western spurs of the Safaid Koh, runs in a south-easterly course through a tolerably open valley to join the Indus in British territory. This valley, which takes its name from the river, is a valuable outlying province of Afghanistan. It first became known to us in 1856, when, with the consent of the then Ameer of Caubul, Dost Mahomed Khan, a British force traversed it to obtain satisfaction from the Turee tribe for depredations committed in British territory. The late Sir Herbert Edwardes and Sir Neville Chamberlain were much struck with the facilities which the route by this valley appeared to offer for a march to Caubul, and Sir Herbert Edwardes, in a report addressed to the Punjab Government, gave it as his opinion that though the actual roadway of the Khyber Pass may contain no ascent so severe as the Paiwar Kotul, yet that the Paiwar would have the following advantages : —

1. That the Paiwar Kotul is a single hill, to be fought up one side and down the other—an operation of a few hours. Whereas the Khyber has two full marches of the most defensible ground in Afghanistan.

2. That the Paiwar route turns the whole of the Afreedee mountains.

3. That the road being through our own Kohat district as far as the Kurrum country, our communications would be good.

4. That were a large force going to Afghanistan, it would give an alternative route for a portion of it, and would besides divide the resistance.

Sir Herbert Edwardes went on to say that it remained to explore the rest of the Paiwar route from the Kotul of that name to Caubul, and that we should then be able to compare it (the Paiwar Kotul) with the Khyber Pass, and the passes above Paiwar with those above the Khyber, and to ascertain the exact merits of each line.

The distance from the British boundary at Thull (here formed by the Kurrum River) to the Paiwar Kotul, is about 40 miles, and for this distance the road, lying as it does up an open valley, presents no difficulties to the march of troops which need be mentioned. Edwardes made light of the difficulties of the Paiwar Kotul, up which he declared that 9-pounders could be dragged by hand with facility, and that the road could easily be made fit for draught. The descent, which Edwardes only judged from such view as could be had from the summit of the Kotul, he asserted to be "comparatively nothing."

A few months after Sir Herbert Edwardes' report was written, the onward road from the Paiwar Kotul was traversed by Major (now General) Sir H. B. Lumsden on his way with the British Mission (1857) to Caubul, and by two other English officers—both accurate, and one a most accomplished observer, Lieutenant (now also General) P. S. Lumsden, and Dr. Bellew. It is well for us that Sir Herbert Edwardes' somewhat hasty conclusions as to the feasibleness of this route to Caubul were thus capable of verification. The result is that now that the contingency of our desiring to march a force to Caubul

by this route has actually arisen, we know exactly the difficulties it presents, and can judge whether it is within our competence to overcome them. Certain it is that the onward 50 miles from the Paiwar Kotul are perhaps as stiff a bit of road as any to be found in Central Asia.

Premising that the *ascent* of the Paiwar Kotul is not quite so easy as Sir H. Edwardes assumed it to be, and that Major Lumsden considered that some labour would be required before guns could be taken up it even with drag ropes; also that the *descent* was (as Edwardes believed) found to be very gradual, the following will embody his observations on the next 50 miles of the road.

1st March.—Zabbardust Kila to Alikhail, 10 miles. Road along the bed of the Keria stream. On the *left, spurs run down and command the road* from different points *along the whole route.*

2nd March.—Alikhail to Hazardarakht. Road up the bed of the Hazardarakht stream. At 4 miles valley narrows to half-a-mile, *with precipitous, commanding peaks on each side*, clad with pine forest. At eight miles road narrows to 200 yards. From this point the road is *entirely commanded by spurs, and running down from lofty mountains to the bed of the stream.* Encamping ground bad, and would require the troops to be scattered. Guns *would have great difficulty* in this march, owing to the rocks and stones which have been rolled down and settled in the bed of the torrent. No provisions or forage obtainable.

3rd March.—Hazardarakht to Hazra, 8 miles. Road for 2 miles like last march. Thence to Surkai Kotul (5 miles) easier. The Surkai Kotul is short, *but very steep*, and the soil being clay would be very slippery after rain. The ascent *is commanded by hills on both sides.* Heights all round encamping ground would have to be held. Elevation of Hazra, 13,458 feet. It is blocked with snow from December to April.

4th March.—Hazra to Dobundi, 8 miles. Gradual descent for 2 miles *along narrow gorge commanded by peaks all round*, as far as the summit of the Shuturgurdun Pass. *Descent* towards the Logur valley very steep, with sharp zigzags. For wheeled carriages impracticable without vast expenditure of money and labour. The rugged mountains overhanging both sides of the pass, with huge masses of naked limestone cropping out in every direction, *offer cover to an enemy, from which it would be difficult to dislodge him without great loss*, and it would be difficult to withdraw covering parties after the *descent* of the pass had been accomplished. In fact, supposing opposition offered, it is difficult to conceive a worse pass for the passage of an army. From the top of the Shuturgurdun Pass to the village of Akhunkila, road is along bed of a small stream never more than 100 yards broad, with *huge cliffs towering up several hundred feet on each side.* After passing Akhunkila road narrows to 30 feet, and continues very steep, till joined by a stream coming from the north.

5th March.—Dobundi to Khooshee, 9 miles. Road leaves the bed of the stream after 2 miles, and passes over a small, steep hill, called Shinkai Kotul, &c., &c.

Kooshee is from Caubul five marches.

I think those who have given me their attention through the above details of the route between the Paiwar Kotul and the Logur Valley,

will agree with me in thinking that there is no adequate object to be gained in marching a force to Caubul by a route presenting such exceptional difficulties; especially when it is further remembered that one of the tribes who inhabit this difficult country is perhaps the most savage, most ill-disposed towards us of any in Afghanistan. It is fair, I think, to presume that General Roberts's column has been moved into the Kurrum Valley with other objects than to make use of the valley as an alternative route to the Khyber by which to reach Caubul. These objects probably are to occupy an important though outlying province of Afghanistan; to keep employed a portion of Shere Ali's army, and so relieve to some extent the pressure to be brought on the Peshawur column; lastly, perhaps, to steady the great Afreedee clans in the east of the Safaid Koh by showing an inclination to take their country in reverse. If these objects are attained, the employment of 5,000 or 6,000 men in the Kurrum Valley will not have been without effect on the general result of the operations.

There are other passes leading to Afghanistan from the Indus valley of which we have knowledge—in particular what is called the Gomul[1] or Ghwaleyree Pass, which is the pass used by that interesting tribe of nomad merchants, known as Povindahs, who fight their way every spring, in three compact bodies, from the neighbourhood of Ghuznee to the plain of the Indus, and there leaving their wives and children, and young and weakly camels, spread themselves over upper and western India, as far as Calcutta and Kurrachee. We are indebted to the enterprize of the late Major Broadfoot for a minute description of this route. He attached himself to the yearly Povindah caravan, in the neighbourhood of Ghuznee, when a young Lieutenant in the Madras Engineers, and travelled with it through all its dangers and adventures to Dera Ismail Khan. From his description it would seem to present no great obstacles barring the hostility of the Wuzeeree and other tribes, through whose territories it lies; but I shall dismiss it, and at least another route known to have been traversed by the armies of the Mahommedan invaders of India, without further notice, because on this occasion it is better to confine ourselves to such routes as come within the field of present military operations.

Nor do I think it necessary to offer any lengthy remarks on what is really the alternative route to the Khyber, both to or from Afghanistan —the Bolan Pass—because, fortunately for the ease of our present operations, that pass is *actually* what some think the Khyber Pass *ought to be*, behind instead of in front of our advanced posts. An advance of 15 miles from Quettah will place General Biddulph's column on Afghan soil.

The situation then is this: the eastern and south-eastern frontiers of Afghanistan are open to attack from three principal different points—the Khyber, the Kurrum Valley, and Quettah. At the two last of these points nature has interposed no obstacle to an advancing army. At the first she has interposed a most formidable barrier in the shape of a

[1] For the positions of the Gomul, Bolan, and Kojuk passes, see the map to General Hamley's lecture in this number of the Journal.—Ed.

tangled web of mountains, inhabited by tribes of singular ferocity and barbarism.

It will be expected, in a lecture of this kind, that the lecturer should at least express an opinion on the much-mooted point of whether the hither or the further side of the Khyber mountains is the most desirable boundary for our Indian Empire. In the presence of those whose opinion on questions of military tactics and strategy is received with respect amongst the most military nations in Europe, modesty forbids me to express more than a very qualified opinion. I would say then that if we, the masters of British India, can afford to remain quiescent until hostile legions actually emerge from the passes, there is no doubt that our position behind the passes is strong, and that the present frontier is as good as can be desired. But it is a most sound maxim that the best defence is an "offensive defence;" a defence which is always ready to strike a blow in advance at an approaching enemy; and this maxim, if true, is surely particularly applicable to the case of Afghanistan. It is not so much the actual blow which constitutes the danger here, as the condition of things which would precede and accompany the striking of that blow; the state of unrest which would prevail throughout the whole Indian Peninsula; the doubt in men's minds while the blow was still impending what might be the issue of the coming contest; the hope of successful rebellion which we should flatter ourselves unwisely if we did not believe it might find a place in the breast of many of our feudatories. It is in these considerations that I see the advantages of a frontier beyond the passes; the disadvantage of first having to pass such a barrier as the Khyber before a blow can be struck in advance at the gathering forces of an enemy. To this I know it may be replied that the barrier may be surmounted just as well when the time for striking a forward blow comes, as in anticipation of it. But the forcing of the barrier is in itself an exhausting operation, and to pass it when thus forced might be to leave a wasp's nest behind,—to hinder our communications and to become in turn our virulent assailants if circumstances made it necessary or advisable to withdraw again through the mountains. Better then it may be said to pass the barrier when time and circumstances are in our favour, and to make such permanent arrangements for securing the road as may enable us to use it in safety, even under the most unpropitious circumstances.

So much on this subject I feel that I may be expected to say. We now, however, are dealing with accomplished facts, and for the present at least theoretical speculations may be postponed. Afghanistan has thrown down the challenge to us, and we have accepted it. The Khyber has been forced—not in view to executing a movement of *defence* against an enemy gathering to attack us, but in view to assert the principle that we will admit of no rival in Afghanistan, and that the Ameer must subordinate his policy and his inclinations to our necessities. Three British columns now stand at different points on Afghan ground. The capital, Caubul, is threatened from at least two different points. By one of these columns at least obstacles of ground

quite as formidable as the Khyber have yet to be surmounted. The Jugdulluck Pass, the Huft Kotul, and the Khoord Caubul Pass still block the way to Caubul. Before the Quettah column still stands the Khojuk mountains. Of all these, time permitting, I hope to say something, but whilst the onward course of military operations is still unrevealed, I will ask your attention for a short time to the population and the military strength of the Ameer's dominions.

It is difficut to compress into the limits of this lecture any detailed notice of the various tribes and people who inhabit the Ameer Shere Ali's dominions. A few words however must be said on this branch of the subject.

The population of Afghanistan falls into two grand divisions, the Afghans properly so called, who may be further distinguished as the Pushtoo-speaking Afghans; and the pseudo-Afghans, who use a distinct language—the Persian—and are really of a different race. The first of these divisions again is capable of sub-division into Afghans of pure and Afghans of inferior blood. Of the former the Douranee and the Ghilzie clans may stand as exemplars; of the latter the Afreedees. But these delicate ethnological distinctions would be out of place in a lecture of this kind, and we may content ourselves with noting the two grand divisions above stated—the Pushtoo-speaking and the Persian-speaking divisions.

First among the former, both in numbers and importance, stand the great clan of the Douranees. This clan, to which the reigning Ameers always have belonged, is spread over all that portion of Southern Afghanistan, of which Candahar and the less known town of Furrah are the centres. "The Douranees," says Elphinstone, "are distin-"guished from the other Afghans by their consciousness of superiority, "combined with a sense of national dignity, which gives them more "spirit, courage, and elevation of character than the other tribes, at "the same time that it renders their behaviour more liberal and "humanized." I am not sure that with our present knowledge of the Douranees Elphinstone's estimate of them would be thought quite correct by competent judges. Let that however pass. The Douranees are at any rate the most important clan in the whole Afghan nation, both in point of numbers and of general superiority.

Next in importance to the Douranees come the Ghilzies.

The fighting strength of this powerful clan is calculated by Major Lumsden (who was at the head of the Candahar Mission in 1857, and whose sources of information were of course excellent), at 30,000 men. The country they occupy may be roughly described as extending from the Jellalabad-Caubul road on the north, as far as, or a little beyond, Khelât-i-Ghilzie on the south. Their western boundary is the range of hills which skirts the west of the Caubul-Candahar road; their eastern, the Suleiman range. Within the Ghilzie limits falls the Shuturgurdun Pass, of which we may perhaps hear a good deal presently. The Ghilzies will also doubtless be the principal opponents of General Browne's column in the Jugdulluck and other passes in the probable advance upon Caubul. They are acknowledged amongst the Afghans as the bravest and hardiest of

their race: and our own experience in the first Afghan war certainly confirms this estimate. On more than one occasion they advanced boldly in the face of a direct fire of artillery, and were only stopped by the bayonets of our Sepoys. But whilst doing justice to the fighting merits of this clan, it will not be forgotten that it was the Ghilzies who bore the principal share in the massacre of our helpless soldiers and followers on the fatal Caubul retreat. General Browne's column may expect to see much of the Ghilzies when he advances from Jellalabad, and they will form a most valuable support to the Ameer's regular troops, as operations draw our columns nearer to Caubul. General Roberts, too, will doubtless form their acquaintance should he ever approach the Surkai and Shuturgurdun Passes.

Joining the Ghilzie country to the south, we find certain Pushtoo-speaking tribes, which I imagine cannot be relied upon by the Ameer to take any prominent part in the general defence of Afghanistan, owing as they do but scanty allegiance to him. These clans would doubtless oppose an obstinate resistance if attacked in their own country. The tribes referred to are the Kâkars, who are said to number from 14,000 to 20,000 fighting men; and the Tarins, whose fighting strength is said to be about 6,000 men. These might be expected to combine with their neighbours in resisting a British force, if to do so would not take them very far from their country. Any offensive operations undertaken by these three tribes will be, presumably, in the direction of the Bolan and Khojuk Passes, and on the onward march of General Biddulph's force to Candahar.

Turning now northwards to other Pushtoo-speaking tribes of Afghanistan, I would mention—though not strictly subjects of the Ameer's—those well-known tribes of the eastern end of the Safaid Koh mountains, the Afreedees, the Orukzyes, the Khyberries, &c., also two tribes, undoubted subjects of the Ameer's, the Turees and the Jajees in the Kurrum Valley. As far as events have yet declared themselves, none of these tribes except the last seem likely to join heartily against our invading columns, and the Ameer's defensive strength will be proportionately reduced. The Momunds, on the north bank of the Caubul river, and also subjects of the Ameer, appear from recent accounts to have deserted his cause, and, nominally at least, to have made their submission to General Browne. I think this list pretty well exhausts the Pushtoo-speaking races who compose the population of Afghanistan. The Bajowrees have never been his willing subjects, and are not likely to become such after our recent successes.

A bare enumeration of some of the Persian-speaking tribes must suffice. They are—

1. The Kizzilbashes, estimated by Major Lumsden at 30,000, and many of whom are found in the Ameer's regular cavalry and artillery.

2. The Tajiks, estimated by the same authority at 100,000, many of whom also serve in the Ameer's regular regiments. They are chiefly met with in the Caubul and Ghuznee districts, and being looked upon and treated by the Afghans as an inferior race, it is not likely that they will fight with any very great zeal in the Ameer's cause.

3. The Hazáras. These are only partially the subjects of the Ameer; the inhabitants of the interior of the Hazára Mountains being quite independent. The remaining classes which go to make up the total population of Afghanistan may remain unmentioned.

When we come to estimate the probable gross number of the Ameer's subjects, we are met with very serious difficulties, as must always be the case where the census is unknown, and statistics of the rudest kind. Lumsden, in 1858, estimated the total number of the Ameer's subjects at two-and-a-half millions, including one million for the population of Balkh, &c. According to the estimate of the Russian Central Staff Office, as lately given in the columns of the *Times*, the population of Afghanistan is six millions. It is open to us to choose between the two authorities, Major Lumsden and the Russian Staff; and I think there can be little doubt which is most likely to be correct. I may here remark that though the information which the Russians have recorded regarding Afghanistan is curious, and shows the interest they are taking in the concerns of that country, yet that a careful examination of what they have chosen to make public on the subject, shows that their information is very unreliable. It may be confidently said, I think, that the Russians do not know so much of Afghanistan now as we have known since the first years of the century through Mr. Elphinstone's wonderful book. Lumsden believes that his estimate of two-and-a-half millions is rather above than below the mark. Certainly it was made 20 years ago, but there has been nothing in the subsequent history of the country to make it probable that the population has increased in that time. In calculating the fighting strength of the Ghilzies he reckons it at one in every seven of the population. If this can be relied on for the other tribes, and if the whole population is what Lumsden supposes, two-and-a-half millions, Afghanistan would have a fighting strength of about 375,000. The character of the people, however, and the endless private feuds and clan jealousies which exist among them, make it extremely unlikely that the whole population would ever unite for a common object, and conclusions drawn merely from numbers in estimating the probabilities of a national resistance would be likely to be erroneous.

I now approach a branch of the subject which at present possesses peculiar interest. I mean the Ameer's military resources.

In 1857, Major Lumsden being resident at Candahar for some months at the head of the British Mission, was able to obtain very accurate information as to the then regular army of the Ameer. At that period the regular infantry consisted of 16 regiments, of a nominal strength of 800 men each, "as fine a body of men," says Lumsden, "in point of physical power, as any to be found in Asia, and "appearing at first sight capable of enduring great fatigue."

"But," continues Major Lumsden, "after seeing a good deal of "these men, I considerably doubt their power of endurance." These regiments, he tells us, are recruited by the forcible seizure of a certain number of able-bodied men from each district, who are compelled to serve, on pain of imprisonment, and the consequent utter ruin of their families.

The regular regiments were armed, in 1857, with the old flint musket and bayonet of the British army, or an imitation of them made at Caubul; a few companies having a similar imitation of the now obsolete 2-grooved rifle. The accoutrements were the refuse of the British magazines, and had evidently been picked up at auctions of condemned stores at Peshawur, and other frontier stations; or had been made at Caubul. The clothing was the cast-off uniforms of the British regiments, the officers of all grades in the same regiment being dressed in every variety of British habiliments, from the General's full dress, to the whipper-in's hunting coat! The pay of the infantry soldier was and probably is 5 rupees nominally a month; with, however, two months in each year deducted on account of clothing and necessaries. The distribution of pay was most irregular, and a portion of it was always paid in grain, or by a remission of revenue made to the soldier's family. The natural result of this unsatisfactory mode of paying the men was that they were frequently left without the means of subsistence, and were driven, by sheer starvation, to subsist themselves by plunder and highway robbery, the proceeds of which were often shared by the officers.

The discipline was harsh in the extreme. Fines were constantly inflicted on the most trivial pretences. Sometimes the men were stripped, and beaten with sticks till insensible. "In short," says Major Lumsden, "the ill-treatment the men habitually receive is "such, that only fear keeps them from mutiny, a crime visited by "instant death, or other hardly less severe punishment."

The infantry regiments which came under the notice of Major Lumsden were indifferently drilled, and the officers possessed little knowledge of their duty. Target practice was entirely unknown, and the men were in consequence wretched shots.

The Ameer had, in 1857, three regiments of regular cavalry, a bad imitation of the old Indian regular cavalry (extinct since the Mutiny), to the extent even of copying their hussar saddles and steel scabbards. The appointments were of the same inferior class as in the infantry. The men were kept all through the summer at foot-drill, the horses being sent to a distance to graze. From the want of knowledge of their duties on the part of the officers, this arm was declared by Major Lumsden to be quite useless. By their shadow of discipline the men had lost the individual confidence, so requisite in irregular troops, without acquiring the collective confidence of regular cavalry.

The Ameer's artillery in 1857 consisted of 1 mortar, 3 heavy, and 76 field guns. The officers had no scientific, and very little practical, knowledge of gunnery. They knew for instance the composition of a fuse, and how to fill it, but were unable to cut one to the required length for a given distance. The men were clothed in our old artillery uniforms. Many of the guns were unserviceable and without ammunition. The equipment and carriages of many of the field guns was in the most inefficient condition.

The state of things above described was what a most competent person found twenty years ago under so able a ruler as Dost Mahomed. It would be rash to assert that things may not have altered for the

better since then. We know, indeed, for the matter of arms, that the Ameer has, within the last few years, received from us a battery of field guns, 10,000 Enfields, and 5,000 Sniders. The Enfields and Sniders would be enough to arm the whole of the infantry as it was in 1857. It is said that the regular infantry has been added to of late years. The Russian accounts, however, above referred to, and which seem to bear date about 1868, do not bear out this view, as they estimate the regular infantry at 10,000, or about the same as Lumsden. But whether such troops as Lumsden represents these to be have been increased or not, appears to me quite immaterial. The real question is whether their quality and discipline has been improved. I see nothing to show that they have; and if this be so, there is little to alarm us in having to fight any number of such regulars, than whom the armed peasantry of the country would be far more dangerous foes. The Ameer, however, has a far better and more formidable description of troops behind in his irregular infantry known as Jezzailchees, from the arm they carry. The following is Lumsden's account of them:—

"Besides his regular army, the Ameer has always available the "Jezzailchees, which were formerly the only infantry in the country. "They are tirailleurs, or light troops, armed with matchlock or jezzail, "and accustomed to hill warfare, and are perhaps as good skirmishers "as are to be found in Asia, being excellent judges of ground and "distance. Instinct teaches them almost to scent an ambush, and it "is a current remark in the country, that a good Jezzailchee on a hill-"side will conceal his body behind his own grass sandals. The "Jezzailchees are of two descriptions—those in Government pay on "a nominal salary of 5 rupees a month (paid chiefly in grain), and "armed by the State; and the Jezzailchees of the different chiefs, "who generally have a piece of rent-free land assigned to them in lieu "of pay. The Government Jezzailchees now (1857) number some "3,500 men."

The numbers of the second description of Jezzailchees, namely those in the private employ of the different Sirdars, Major Lumsden professed himself unable to determine. He feels certain, however, that in no one place could 1,500 of them be got together for service; "for," says he, "we must remember that an Afghan hates no one so sincerely "as his nearest neighbour, if he be more powerful than himself; and "that his love of country, or any other human tie, will always give "place to his self-interest or love of revenge; so that a collection of "the whole male population, for any length of time, for a given object, "is simply impossible, although a considerable number might be got "together to make a rush for the sake of plunder."

Behind the regular cavalry, as behind the infantry, there is a far more formidable body of irregulars, which Lumsden estimates at 20,000. "These troops," he says, "are equal to any undisciplined "horsemen in Asia, mounted on small but wiry horses." "They are "rough and ready soldiers, capable of undergoing great fatigue, "terrible to a flying foe, good hands at feeling for an enemy, or "foraging; and when led by a determined chief, anything but con-"temptible in a *mêlée*."

Shere Ali is said, I believe, to have at the present moment a standing army of 80,000 men, including the Jezzailchees. If this really be so, which I am inclined to greatly doubt, and unless Major Lumsden was grossly misinformed as to the strength of the standing army in 1857, the inference would be that within the last few years Shere Ali has been able at least to quadruple his military force, and of course the cost of maintaining it. Is this credible? Is there any reason to suppose that the financial condition of Afghanistan has improved so much in the last few years as to make such a vastly-increased military expenditure possible? I therefore take leave to doubt very strongly if Shere Ali has anything like the organized force which report says. But if he has, or at least, if much of this extraordinary increase has occurred in his regular troops, I can only say, so much the better for us. It would be little short of miraculous if the half-starved, mutinous, and ill-treated regulars whom Lumsden saw twenty years ago, should have grown, during that time, into a force capable of contending on equal terms with even the British Sepoy of the present day, let alone the British soldier with his admirable arm of precision. As easily can the leopard change his spots as the Afghan his habits. The starved and cheated regulars whom Lumsden saw in 1857 are, we may rely upon it, equally starved and cheated in 1878. The more, then, of this kind of soldier Shere Ali can put into the field, the better: of all bad troops, ill-disciplined regulars are the worst, and unless the experience of the first Afghan war is to be altogether belied, neither regular nor Jezzailchee, still less the armed peasantry of the country, will stand for a moment before such troops as are now arrayed on Afghan soil, under Generals Browne, Roberts, and Biddulph.

My lecture has already extended to a length which I fear must have wearied many of you. But the field is so large, and so much of the subject still remains untouched, that I can only hope that on some future occasion what is now perforce left unsaid may find expression from another lecturer.

Only the veriest outworks of the subject of "Afghanistan and the "military operations therein" have been approached by me; and I feel very like an impostor when I think how little impression has been made in the real defences. I conclude with the following pregnant words of Major Lumsden, written, it is true, twenty years ago, but which it is impossible to doubt are equally true now:—

"As might be expected from the needy and tyrannical disposition "of the Ameer's sons, at a distance from his control, quiet and indus-"trious communities are ground to the dust, and their rich and once "cultivated lands fast turning to wilderness; while more turbulent "races hold their own by sheer force; mercantile classes are ruinously "and arbitrarily taxed, and citizens, under the cloak of municipal "legislation, are fleeced of their substance without gaining security in "their homes, but on the contrary their houses are frequently robbed, "and families dishonoured by a licentious soldiery, constantly on the "verge of mutiny, and let loose on the community to make up the "arrears of their own pay so unjustly withheld from them."

APPENDIX.[1]

The northernmost or Khyber Division numbers about 8,000 men, with 42 guns; the Central or Kurrum Field Force, about 4,500 men, with 24 guns; the Southern or Quetta Division, 4,000 men, with 18 guns.

Khyber Expeditionary Force.

Lieutenant-General Sir S. J. Browne, K.C.S.I., V.C., C.B., commanding; Quartermaster-General Colonel C. M. Macgregor, C.S.I., C.I.E.

Commanding Royal Artillery, Colonel E. Williams, C.B.; commanding Royal Engineers, Colonel F. Maunsell.

Cavalry Brigade.—Colonel C. Gough, V.C.; 10th Hussars, Lieutenant-Colonel Lord Ralph Kerr; Guides Cavalry, Major G. Stewart; 11th Bengal Lancers, Major Boyle; one battery Royal Horse Artillery.

1st Infantry Brigade.—Colonel H. Macpherson, V.C., C.B., Brigade-Major D. Macpherson, B. S. Corps; 4th Battalion Rifle Brigade, Lieutenant-Colonel Newdigate; 4th Goorkhas, Lieutenant-Colonel J. P. Turton; 20th Punjab Infantry, Lieutenant-Colonel Rogers; one company Sappers and Miners; Hazara Mountain Battery.

2nd Infantry Brigade.—Colonel Tytler, V.C., C.B., B. S. Corps; 1st Battalion 17th Foot, Lieutenant-Colonel Dalrymple Thompson; Guides Infantry, Lieutenant-Colonel F. Jenkins; 1st Sikhs, Major A. G. Ross; one company Sappers and Miners; one battery R.H.A.

3rd Infantry Brigade.—Colonel Appleyard, 85th Light Infantry; 81st Foot, Colonel Chichester; 14th Sikhs, Lieutenant-Colonel Williams; 27th Punjab Infantry, Major Birch; one company Sappers and Miners; one battery Field Battery.

4th Infantry Brigade.—Brigadier-General C. C. Ross, C.B.; 51st Light Infantry, Lieutenant-Colonel Acton; 6th Native Light Infantry, Colonel Thompson; 45th Sikhs, Lieutenant-Colonel Armstrong; one Company Sappers and Miners; one battery Field Battery.

The Artillery force attached to Sir Samuel Browne's Division comprises the following batteries:—

I Battery A Brigade R.H.A., Major Tupper; D Battery A Brigade R.H.A., Major P. Hill; H Battery C Brigade R.H.A., Major C. Nairne; C Battery 3rd Brigade R.A., Major Magenis; C Battery 4th Brigade R.A., Major Auchinlech; D Battery 4th Brigade R.A., Major Davidson; Hazara Mountain Battery, Captain de Latour.

Kurrum Field Force.

Major-General F. S. Roberts, R.A., V.C., C.B., commanding; A.D.C. Captain Lord W. Beresford, 9th Lancers; Assistants Adjutant-General, Major W. Galbraith, 85th Light Infantry, and Captain J. Davidson, B. S. Corps; Assistant Quartermaster-General, Major H. Collett, B. S. Corps.

Cavalry Brigade.—Colonel H. Gough, V.C., C.B., one squadron 10th Hussars; 5th Punjab Cavalry, Major B. Williams, commanding; 12th Bengal Cavalry, Colonel P. S. Yorke.

1st Infantry Brigade.—Colonel Cobbe, 17th Foot, commanding; D.A.Q.M.G. Captain Kennedy, B. S. Corps; Brigade-Major, Captain A. Scott, V.C., 4th Sikhs; 2nd Battalion 8th Foot, Lieutenant-Colonel Drew; 5th Punjab Infantry, Major M'Queen; 29th Punjab Infantry, Colonel J. J. H. Gordon.

2nd Infantry Brigade.—Colonel Thelwall, C.B., B. S. Corps; D.A.Q.M.G., Captain F. Carr, 5th Punjab Cavalry; Brigade-Major, Captain G. de C. Morton, 6th Foot; 72nd Highlanders, Lieutenant-Colonel F. Brownlow; 2nd Punjab Infantry, Major

[1] From the *Times* of 22nd November, 1878.

Tyndall; 5th Goorkhas, Major FitzHugh; 21st Punjab Infantry, Lieutenant-Colonel J. M. Stewart.

The following Batteries are attached to this force:—

F Battery A Brigade, R.H.A., Major W. Stirling; G Battery 3rd Brigade, R.A., Major Blackwood; 11th Battery 9th Brigade R.A., Major E. Dyce; Peshawur Mountain Battery, Captain Charles; Lieutenant-Colonel A. H. Lindsay commands the Artillery of this column.

QUETTA EXPEDITIONARY FORCE.

Major-General A. S. Biddulph, R.A., C.B., commanding; Assistant Adjutant-General, Major G. B. Wolseley, 65th Foot; Assistant Quartermaster-General, Colonel H. Moore, C.I.E.; D.A.A.G., Captain R. Stewart; D.A.Q.M.G., Captain H. B. Hanna; Commanding Royal Engineers, Lieutenant-Colonel W. Hichens; Commanding Artillery, Lieutenant-Colonel C. B. Le Mesurier.

Cavalry Brigade.—Colonel Palliser, C.B.; 1st Punjab Cavalry, Major M'Lean; 2nd Punjab Cavalry, Colonel T. G. Kennedy; 3rd Scinde Horse, Lieutenant-Colonel Malcolmson.

Artillery Brigade.—E Battery 4th Brigade, Royal Artillery, Major Martells; No. 1 Punjab Mountain Battery, Captain Kelso; No. 2 Punjab Mountain Battery, Captain Swinley; Scinde Mountain Battery, Captain H. G. Young.

1st Infantry Brigade, Colonel Lacy, commanding.—70th Foot, Colonel Pigott; 1st Punjab Infantry, Major F. J. Keen; 19th Punjab Infantry, Colonel E. B. Clay; 26th Punjab Infantry, Lieutenant-Colonel M. G. Smith; 32nd Punjab Pioneers, Colonel Morgan; 29th Bombay Infantry, Lieutenant-Colonel Nicholetts; 30th Bombay Infantry, Colonel Mainwaring.

The CHAIRMAN: Before making any remarks on the paper myself, I will invite any gentleman who is acquainted with the subject to open a discussion on it. The only suggestion I have to make is, that political matters may be put on one side. We are confined here to military topics, and I am sure there is quite sufficient material in the very interesting and important paper which has been read, to give rise to a discussion, without trenching at all on forbidden ground.

General FYERS: I may state that I was present in Afghanistan with General Nott in 1841, and my object in rising is to ascertain from yourself, Sir, and others, on what grounds the frontier is to be stopped at Jellalabad. If we are to draw our line through the Jellalabad valley, it seems to me a very grave mistake will be made. We must remember that that frontier will not remain simply as a frontier between ourselves and Afghanistan, but it will be the frontier (and we must take that view of it from this time) between ourselves and Russia. I cannot express to you my extreme anxiety on this point of the frontier; and I think all military men will agree with me, that when we have the power of drawing a frontier to please ourselves, that frontier ought to be in every respect a substantial frontier. Now the fact is, that Jellalabad can be turned in a great number of places and points. In taking up your most forward position at Jellalabad in that particular pass towards Cabul, you can be turned at a great number of points.

The CHAIRMAN: Permit me to mention that the subject that you are discussing, although of very great interest, is to form the particular subject of a lecture, which General Hamley will give on "The strategical condition of our Indian north-"west frontier," the observations therefore that you are now making will be more appropriate on that occasion.

General FYERS: I was not aware that this important question was to be made the subject of a separate lecture.[1]

[1] NOTE.—With regard to our position at Jellalabad being turned—what I mean by the expression *turned* is, that you could be easily invested and your entire communications severed from many points, unless you hold the surrounding mountain districts in force, and also possess the loyal and thorough co-operation of the tribes adjacent to

Lord WAVENEY: With the permission of the meeting I will offer a few observations on the general question. The point that has most struck my attention in the lecture is the reference that has been made to the probable strategy which has dictated the advance of General Roberts, namely, the moral considerations that are to be derived from it, and the support that is to be given to the operating columns on either flank by the position that he may have to occupy, although he may never pass the Shutergardan Pass. That observation is ingenious, and well worth our consideration. With regard to the establishment of the frontier, I was very much interested, and I have no doubt Officers present will have read with attention a translation from the report of a German Officer in regard to the position of British India and particularly as to points of defence on our north-western frontier. He summarizes the whole in a manner which gives us the point on which the problem should, in my idea, be worked out. He speaks of the north-western

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these passes. Now it appears to me that the only way of saving the occupation of Jellalabad from the charge of being a mistake is, by regarding it as a central position for that attraction which would unfailingly result from a wise and conciliatory policy set in action among the chiefs and the different tribes or clans from thence. It is argued by Officers of great experience, that the Afghan tribes are such wild, rapacious, and untameable men, that any and every attempt to get at them with the thin end of civilization would be certain to fail; looking, however, to the success which has crowned the efforts made by our countrymen in other parts of the world, and notably in Canada, in South Africa, in New Zealand, I cannot but feel a confident assurance that the same description of wise and patient conciliatory treatment of the Afghan tribes over whom we could now bring to bear this benign protection, would in time be rewarded by a loyal and very thorough attachment on their part. I have it much at heart, therefore, that should we for military reasons deem it wise to take and occupy the Jellalabad Valley, the chiefs of all the neighbouring tribes should be invited to assemble at Jellalabad, there to meet a Commissioner appointed for the duty, who should lay before them a well-considered plan of forming a confederacy which should regard the British Government as their protector; that this confederacy should also have its annual meeting or assembly of chiefs at Jellalabad under the presidency of the Commissioner, to decide upon all matters affecting their own interests and affairs generally.

I am impressed with the belief that, by a truly liberal and generous treatment of these tribes, and by giving them every aid in the improvement of their land, by the encouragement of productions for which their valleys are presumably capable, and by the gradual growth of commercial relations with India, you would establish such a condition of things as would form your most reliable protection against any action of an enemy, whether that action took the form of intrigue or more openly of armed interference. I must say I prefer to take this view of our duties towards those tribes; for, under any circumstances, I would sooner thus reclaim our neighbours than be always under the painful necessity of regarding them as impracticable, irreclaimable savages.

I consider that unless we do decide on acting in this way towards these tribes, we are going too far in going to Jellalabad, or not far enough. The true strategical line, however, of either attack or defence of Afghanistan is by Candahar. On the broad ground of acting thoroughly in such a matter, I am of opinion that as much of the valleys which belong to the watershed of the Indus to the south of Kaffiristan and the Suffaed Koh Mountains, and as far south as the Pisheen Valley, should be in this manner and in this spirit brought under our protection; I also consider it desirable that an understanding should be come to with the Ameer about a British garrison for Herat and for its more perfect fortification; but this is a matter of higher and more general policy, which it would be premature to speak of at present. All I will now say about this is, that henceforth Afghanistan must be regarded as one of the protected States of our Indian Empire; and this being so, it necessarily becomes of urgent necessity that at the conclusion of this war the new aspect of affairs should be thoroughly recognized, and that *all* needful steps for the security of the country should be taken in concert with the Ameer.

frontier of India as being a fortress of which the glacis is not in possession of the garrison. It appears to me a most accurate and clear illustration of the point at issue, and of the responsibility that awaits upon those who determine on whether the garrison shall be in possession of the glacis or not. And this leads me to another point, for if the whole object of war be merely to make war, and military success alone, or even political success, is to be the sole result of our occupation, a great portion of the advantage to be derived from our military success will, I fear, be lost or kept in abeyance. It is well for England, when she stands on the old paths and follows out the course by which she has consolidated her empire; as I have said on a former occasion, if war does not lead, not only to the development of our civilization and the consolidation of our frontier, but also to that of our material interest, then, indeed, war, though it has attained a portion of the advantages for which it was waged, has not obtained all. From the factory comes the fortress; the factories made the three great Presidencies of India; and when I say factories, I mean those centres of British commerce and industry, which should arise on the track of and follow our troops' victorious advance. I believe that the result of these movements would be to reopen to us the markets of Central Asia, from which we have been thrust back, partly by the skill of our Russian rivals, but also partly by that neglect, born of too great security, that has prevented us from sending goods as valuable as we should into the markets which the Russians have occupied. And I turn here to a quotation that I made from one of the most remarkable works on the interior of Russia in her aggressive and advancing qualities. I speak of the works of that great traveller Atkinson, and the account he gives of the Amoor and Upper Siberia, especially on the frontier that the Russians now occupy. He speaks of the commerce carried on in the markets of Kokand, in the Khanates, and generally throughout that portion of Asia which we have lost as a field for our trade. My belief is, that with returning peace we shall have the opportunity, or at all events ought to have, of recovering these peaceful conquests. Then, again, with regard to the means by which these are to be maintained, I have acquired in this excellent lecture information which was perfectly new to me until this day, of the success of that merchant class who force their way yearly through the fiercest of mountain tribes of the Gomul Pass, not as armed men, but carrying merely their packs, with the burden of their goods, their women and children. Now if we are to form our frontier on the glacis or external slopes of the hill region, and if we are to occupy the Gomul Pass, then I say, place the Gomul Pass in the charge of these soldier merchants, and they will keep the passes open under all circumstances. I have to apologize for these suggestions, but they have occurred to me lately very forcibly.

Sir MORDAUNT WELLS: I wish to observe on a point likely to be very much discussed, namely, the bearing of this question in reference to the independent hill tribes. In the year 1863 I had the advantage of crossing the Eusufyze valley and visiting the forces during the time military operations were going on at Umbeyla, and I afterwards visited the frontier extending from Peshawur to Scinde. What impressed me the most was the remarkable loyalty and well-being of the dependent tribes formerly hostile to the British Government; and when the question is considered in reference to a rectification of the frontier, no difficulty whatever will arise in reference to the independent tribes. I think a just government of these tribes will being them into the same condition as the dependent tribes now under our jurisdiction in the trans-Indus territory; and if we have been able to secure the loyalty of those tribes, mustering many thousands from one end of the frontier to the other, we shall have little or no difficulty in dealing with the independent tribes. I have heard it observed by those who are not acquainted with the country, that the consequence of attempting a rectification of the frontier will not only make the Ameer hostile to us, but that the independent tribes will be extremely sensitive if we occupy any portion of their territory. Having had the opportunity of communicating with many of the distinguished leading frontier Officers of the Punjaub, I am satisfied that by a bold and just policy similar to that we have carried out since the annexation of the Punjaub, we shall be able to exercise the same power over the independent tribes, and when that is achieved it will be for military men to determine, in a scientific point of view, the best line for the new frontier. I make these

few observations because I think it is not generally understood that in reference to these independent tribes all along the frontier, we shall be able to deal with them in such a way as to prevent any difficulty whatever in the extension of the frontier.

Colonel MALLESON: I should like to refer for a moment to the remarks which have fallen from Sir Mordaunt Wells. I quite concur with him in the statement he has made, that the tribes by judicious and careful treatment will become, I will not say as attached, but as much instruments in the hands of the British power, as any of the other natives of India. It is an historical fact of very great interest that the tribes of the passes have never been subdued. At the time when the Mogul Empire was in its palmiest days, when it was ruled over by the greatest man of the Mogul race, the Emperor Akbar, he who had conquered every enemy to whom he was opposed, who had never been defeated in a pitched battle, brought the whole strength of the Empire and combined with it the strength of the outlying frontiers of Cabul, the outlying passes of the country which the noble Lord has very happily called the "glacis" of Hindostan; he brought that united strength to bear on the tribes of the passes only to suffer defeat. The tribes of the passes remained independent during the whole reign of Akbar, and during the reign of his successors. In vain were attempts made to reduce them; they always held their independence; and this state of things was finally terminated by the Mogul Sovereign granting them an annual subsidy. Things were in that state when the celebrated adventurer called Nadir Shah rose into power. Nadir Shah conquered the whole of Persia and a portion of the southern part of that which is now Russia, and was the head of the whole of the tribes of Central Asia. Leading an army of 100,000 men he tried to traverse the passes into India, but Nadir Shah, who had conquered the whole of Asia, was baffled by the tribes. He refused to pay the tribute they demanded, and for a whole month the tribes of the Khyber Pass baffled his Army. It ended by his agreeing to the terms they proposed to him, which were to continue to them the subsidy which the Moguls had granted before. On the fall of Nadir Shah arose the present kingdom of the Douranees. The Douranees pursued the same course as Nadir Shah, and it was by subsidising the tribes that the passes of India were opened to them. That course was followed until 1841. In 1841 Shah Sujah was the nominal sovereign of Afghanistan. The Government of Shah Sujah was virtually swayed by the British Envoy, and by a misjudged measure of economy it was decided in 1840 to cut down almost one-half the subsidies given to the mountain tribes. It was only yesterday I was reading the account of the result of that attempt at economy. The chiefs of the tribes left the presence of the Envoy promising everything. Within a week from that time, every pass leading from Cabul to the British frontier was stopped, and it was very much in consequence of that ill-judged measure of economy that the calamity of 1841 came to maturity in Cabul. I therefore entirely echo the hope that has been uttered by my learned friend, that whatever may be our policy in the future we shall see the wisdom of coming to such an understanding with the tribes of the passes as will render them true and loyal to the British Government.

The CHAIRMAN: Perhaps you will allow me to say a few words before the meeting breaks up. I have no intention to follow the very interesting paper that has been read to us in any detail. I will only say that I agree, so far as my own experience and opinions go, generally with the tenor of it throughout. It seems to me a very temperate and well-considered digest of the present military aspect of the question. I think it is highly creditable to General Vaughan's judgment and foresight that he should have pointed attention to the exact operations by which our two first successes have been actually achieved. I allude to his having pointed out, in anticipation of what has taken place at Ali Musjid and the Peiwar, that a turning movement was an essential operation in Afghan warfare. Although individually brave, the Afghans lose heart immediately that they find there is an enemy in their rear; and as we have already seen, both in the case of Ali Musjid and the Peiwar, they become demoralized and fly before the advancing forces. This question of frontier undoubtedly is one of very great importance, and in the present stage of proceedings is one, moreover of considerable complexity; for we are unable to understand—at least I am unable to understand—how an advance at three different isolated points into a vast country like Afghanistan—that is an advance

by the Khyber Pass, by the Koorum Pass, and by the Bholan Pass—can be held to form a frontier. They certainly do not constitute a frontier of themselves; the most that can be said of them is that they form a series of advanced posts, upon which a frontier may be subsequently arranged. The question is one of very great interest, and I should trust that General Hamley, who is to address you at the next meeting, will turn his particular attention to it. There are several minor points in General Vaughan's paper, on which I might say a few words, but they are quite of secondary interest. You will remember, for instance, that he divides the Afghan nation into what he calls Afghans and pseudo-Afghans; but the real fact is the people who speak Pushtoo are the only true Afghans in the country; the rest of the population have no more claim to be called Afghans than they have to be called Russians. The real composition of the inhabitants of Afghanistan is as follows: there are two millions of Afghans and two millions of non-Afghans. The latter, who speak the Persian language, or dialects of the Persian language, being naturally favourable to any invading party, because in their normal state they are oppressed by the Afghans, and are thus always looking out for relief from the outside. During our former occupation of the country, all the non-Afghan population was decidedly in our favour. It is so at present and always will be, the true Afghans being the only portion of the population we can have against us. The component numbers of the population are about two millions of true Afghans, two millions of non-Afghans, and one million of strangers, including Turks, Persians, Indians, Beloochees, and several scattered outlying tribes. With regard to the Ameer's actual force, I am afraid that it is larger than General Vaughan has given him credit for. During the last few years, indeed, we have not positive information, but information which appears to be credible, that there has been a very large augmentation of what is called the organized regular force. Whether the force now really amounts to sixty regiments, as is reputed, I cannot say; but all the Officers and intelligent people who have recently come down from Cabul agree in that estimate. And when I say "Officers," I mean the native Officers of our Army, who have a very fair military knowledge, and employés also of our own regular establishments, native doctors, and people of that description, men of education and intelligence, who all describe the actual military forces at and about Cabul as between fifty and sixty regiments. But I quite agree with General Vaughan that the more Shere Ali wastes his strength in forming such regular regiments, instead of relying, as Dost Mahommed did, upon irregular levies, the more certain will be our success. The Afghans indeed are very formidable as irregular troops in holding passes and strong positions. They are exceedingly active, individually brave, and thus give immense trouble to regular troops who desire to dislodge them from their "*sangars*" and strong positions behind rocks and on the hillsides; but if you bring those people down into the plains and mass them in bodies under what they call discipline, but which is really no discipline, that is actually delivering them into the hands of the enemy. It is quite impossible that the so-called Afghan regiments can oppose any effectual resistance to our highly disciplined regular troops, supported with the artillery which we now possess, and bearing arms of precision. When I remember the Afghan fighting, forty years ago, the hill men had us at an advanatge, as our old "Brown Bess," the smooth-bore musket, would not reach half the distance of their jezzails; and when a party, therefore, took possession of an overhanging precipice to fire upon the troops approaching, we were unable to reply with any effect, and it was a very serious and difficult business to dislodge them. At the present day we know that our arms of precision are superior to their weapons, and they know their inferiority as well as we do, which alone will be found, I expect, to dishearten them even more than their general want of discipline. Hitherto, indeed, they have had the greatest confidence in their jezzails, and I feel sure that once that confidence is gone, they will prove to be of no importance as soldiers, not even as irregular soldiers. I could have wished that some of the gentlemen who are here present, and who know the Afghan so well—for I see many Officers before me who have been on the frontier, and are well acquainted with the country—had given us a little of their practical experience. I myself in those days was a political, and not a military Officer, although whenever I had an opportunity I followed my General to the field as his aide-de-camp, and took my share in any fighting that was going on. I hope it will be understood that I do not pretend

to speak on an occasion like this, before so many experienced Officers, as a military man. I speak simply as one who was engaged in the old Afghan War, and who has attentively followed the progress of affairs beyond the Indian frontier, from that time to the present. And perhaps I may be allowed to say in conclusion that I do feel some sort of satisfaction in knowing that I have for so many years done my best to draw the attention of the Government and the country to the dangerous state of frontier affairs, and that I have always advocated the course which is now being followed. I have no doubt the result will be alike conclusive to the safety of India, honourable to the Army, and for the advantage of our national interests.

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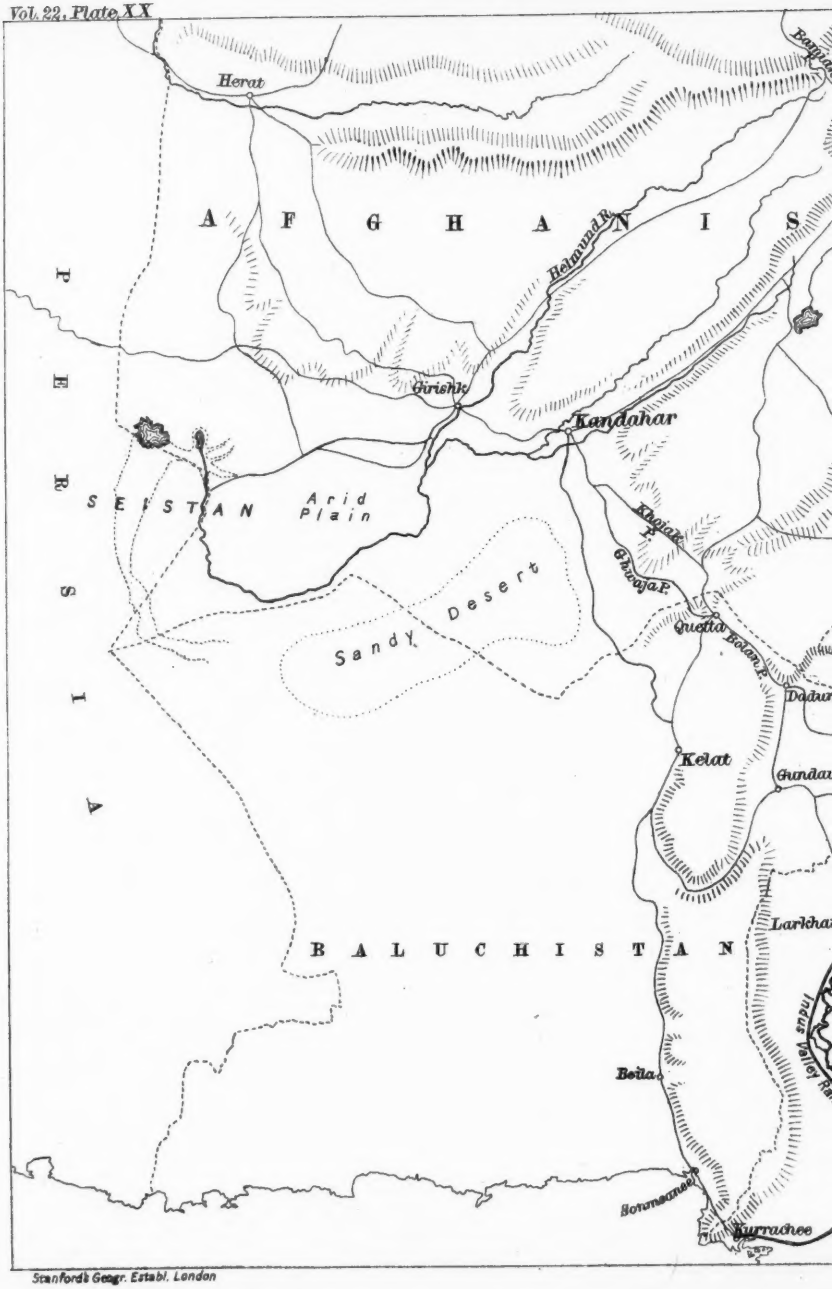

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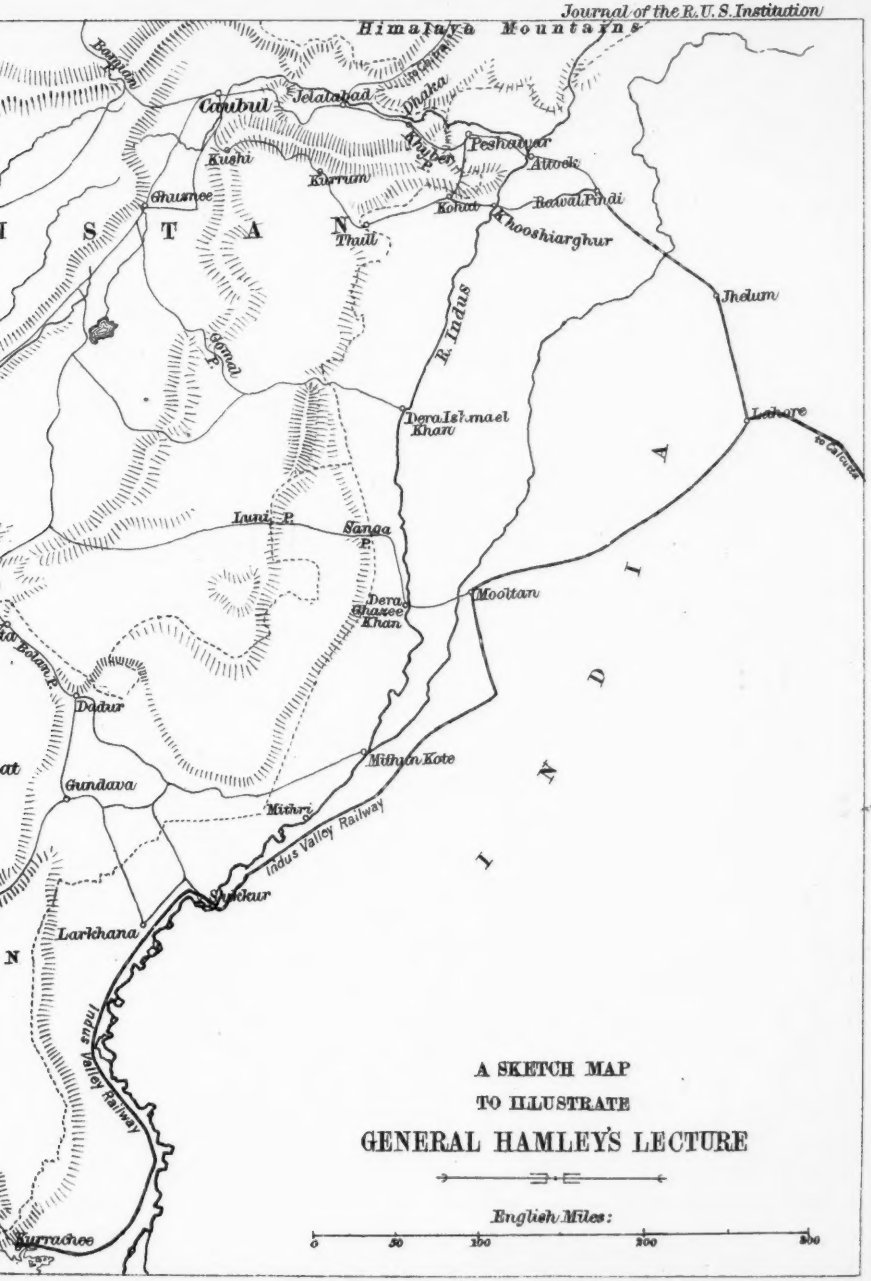

A SKETCH MAP

TO ILLUSTRATE

GENERAL HAMLEY'S LECTURE

English Miles:

0 50 100 200 300

LECTURE.

Friday, December 13th, 1878.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., F.R.S., &c., &c., in the Chair.

THE STRATEGICAL CONDITIONS OF OUR INDIAN NORTH-WEST FRONTIER.

By Major-General E. B. HAMLEY, C.B., R.A.

I APPEAR here, in compliance with the desire of the Committee, to offer some remarks on our Indian frontier. I should not have ventured to volunteer to do so, and I do it, I will not say with reluctance, for I am happy to comply with any wish of the Committee, but certainly not without misgiving, feeling that among you there are certainly some, perhaps many, Indian officials of the highest distinction. But I am encouraged by the thought that a personal acquaintance with a territory is not indispensable to the formation of strategical opinions about it—if it were, the majority of the most famous campaigns would never have been planned. I am encouraged, too, by feeling how little aid the subject requires from me to render it interesting—never has the interest it has excited been so strong as now, though for nearly thirty years it has been warmly discussed by the best minds in India. These still contest each other's conclusions, from widely divergent points of view, and I may therefore perhaps consider it a point in my favour that I have approached the subject without bias, as I would any other strategical problem, desirous only of arriving at a right conclusion, and uninfluenced by the weight of opinion on the one side or the other.

First, let us look to the Indus—often spoken of as the natural frontier of India. To be a good line of defence a river, besides being difficult to cross, should have protected bridges in the possession of the defender, connected by good communications on the defender's bank, and that bank should, at important points, command the other. The Indus is unbridged by any permanent structure. In its upper half it is a swift, even turbulent, stream flowing mostly in a deep rocky bed—from 100 to 400 yards wide—in its lower, though still swift, it flows between flat banks and frequently changes its channel—insomuch that the bridge of one year might be left on dry ground

the next. When the snows melt the river rises and spreads widely over its banks—thus bridges would at times be swept away or submerged, and roads along the bank would be useless. There is a bridge of boats at Attock which has been frequently carried away, and another was thrown two years ago at Khooshalghur. Nevertheless, I believe that permanent bridges might be thrown—it is merely a question of expense. The left bank is flat throughout and is frequently commanded by the right. These are circumstances to be taken into account when we are told that the Indus is the proper frontier of India.

Beyond the river, at an average distance of some fifty miles, runs the frontier line, which let us define for the present purpose as limited on the right by a point opposite the Khyber, on the left by one opposite the Bolan. The distance measured along the river in rear of this line from Attock to Sukkur is about 500 miles, the frontier line of course being considerably longer. This frontier runs for great part of its length along the foot of a mountain range, penetrated between the Bolan and the Khyber only by a few difficult passes. Now of all barriers, that which gives most security, next perhaps to a great desert, is a range of this kind, and hence a few thousand men to prevent the depredations of the hill tribes, suffice to protect an extent of frontier which, were it of a different kind, with a powerful neighbour on the other side, would demand, in case of a formidable war, vast armies, and even in peace very considerable forces, for its defence. There are several passes between the two I have named, but besides the Khyber, it will only be necessary to speak of two in this part of the frontier, the Kurrum, issuing in our territory at Thull and Kohat, and the Gomal, issuing opposite Dera Ismail Khan. Others exist—there is one that issues in the bed of the Kurrum river near Thull—but besides that we know little of them, except that they are exceedingly difficult, there is another reason why I should not occupy any time in describing any south of the Gomal.

There will be no dispute that the Khyber is, of these three, the fittest for the passage of a column of all arms. It is much the shortest, the easiest, the best supplied with water, and connects directly the most important points, namely, the city of Caubul with a favourable place for bridging the Indus at Attock, whence, by the great road, to Lahore, and thence into the valley of the Ganges.

Of the Kurrum we have learnt a good deal. It is easy of passage all the way from the Indus to the Paiwar Pass, but from thence to the point where it joins the hill road between Caubul and Ghuznee, at Kushi, it is of exceeding difficulty, impassable for any kind of vehicle, and rendering the supply of even a lightly equipped column an arduous task. Whether General Roberts had at first any vehicles in his train I do not know. It is to be inferred that he had not, from the fact that his light guns were carried on mules, his heavier artillery on the backs of elephants—however this may be, we may be certain he has none now. The issue of this pass in our territory at Thull is 100 miles from that of the Khyber. A column so strong and well equipped as to be independent could not pass here; one that

could not act independently would scarcely venture; and it is not likely, therefore, that any serious attack will be made by way of the Kurrum, or of that other pass which issues near it.

The Gomal, from Ghuznee, does not present the insuperable difficulties of the Kurrum, and could be made practicable, though not easy, for a column of all arms; at the best it would still present much steep broken extent of track, and many narrow passes. It is very circuitous, and about a third longer than the Khyber, from which it is distant 200 miles.

In forming an idea of a march in force through such passes, it may assist us to remember that an English Army Corps, say 24,000 strong with artillery, extends with its combatant forces only, on a European road about 16 miles in length, and with its trains 27 miles. Allowing only a slight increase for the nature of the road, the combatants of a similar force in the pass would stretch 18 miles, the total with trains 30. Thus, when the head of the combatant column issued from the pass, its rear would be nearly two days' march behind; and considering the host of animals required for the necessary supplies on such an expedition, the rear of the trains could then scarcely be less than six days behind the head of the column, that is to say, only about two marches beyond Jellalabad.

Accustomed as we are to see the mountain chains of Europe successfully passed by great armies, we must be careful to remember how different in depth are those ranges from the hills of Afghanistan. In a couple of marches the Prussian armies were through the Bohemian mountains, and presently combined in the attack at Sadowa. But here, the shortest pass through the barrier, that between Caubul and the Indus Valley, is 190 miles long—the Gomal nearly 300 miles—and not days but weeks are occupied in the isolated march.

Now, when we remember what an invading army of India implies—that it shall bear with it the means of passing the Indus—that it shall be prepared to encounter the forces of our Indian Empire—and that, thus formidable in numbers and equipment, it must rely for supplies on the path through which it has issued, we shall form some idea of the difficulties which would encompass an army in its attempt to enter India by these routes; and these difficulties I will ask you to bear in mind when I recur to this part of the subject. Let us next see what conditions another part of the theatre may present. But first let me pause to say what I understand by an invading army. Not all the assembled forces of the Afghans—not such a Russian force as we saw lately assembling on the frontier of Bokhara—not such an army as Persia can at present send forth—any or all of these would fall far short of the requirements of such an enterprise. But I will suppose that Russia has completed those improvements in her communications which we know she persistently contemplates; that she has united the Caspian and the Aral by a railway; or that, combining with Persia, she has made a convenient way from the southern shore of the Caspian to Herat; that the ruler of Afghanistan has thrown in his lot with them; and that within the fortified triangle Herat, Kandahar, Caubul, the dispositions for this great undertaking have been brought

deliberately, with all the aids of military science, to completion. We may be assured that an invading army of India, such as we cannot afford to despise, will be no improvised force, no barbarous horde, but truly formidable in numbers, organization, and leadership. And I will further assume for the moment that, as has been so often recommended, we await the attack in the valley of the Indus.

From Caubul the confederated forces of the enemy, posted as I have suggested, will threaten an advance through the western passes; from Kandahar they will threaten an advance through the Bolan. Let us follow the movements of what we may call the enemy's Army of the Bolan, assembled about Kandahar. As it moves south it will find the character of the country very different from that of the mountain districts of the north. The hills are no longer of impenetrable aspect; manœuvring ground exists almost everywhere; a great part of the country consists of extensive plains; and though there are a few passes, formidable if held, yet they are by no means such obstacles as those of the Suleiman range. Over one of these, the Khojak, the road passes to Quetta. From thence the main road, and that chiefly used by caravans travelling to the Indus valley, is through the Bolan Pass to Dadur. There is another excellent road to Khelat. From Khelat there are two ways into this portion of the Indus valley, one direct but difficult, the other circuitous but practicable, both leading on Gundava. But the best road, one that with a little labour might be called good, is that through the Bolan, the length of which pass is 59 miles.

But when I speak of these roads issuing in the valley of the Indus, I must indicate the circumstances under which they enter it. The mountain barrier which has continued to define our frontier down to a point in advance of Mittree on the Indus, there turns west and forms the frontier of Khelat for a considerable distance, when it resumes its southerly direction. It follows that the right bank of the Indus from about Mittree to far below Larkhana is an immense plain. Travellers passing along the river there, see the horizon extending like that of the ocean. Into this great plain the Army of the Bolan would issue at a hundred miles from our frontier, and, while halting to concentrate its lengthened columns, and to fortify the passes in its rear, it would see before it a space of the valley of at least 150 miles in width, on any part of which to direct its attack; and having formed its plan it could, I am told on the best authority, advance in the dry season nearly everywhere across this plain on a wide formation and accompanied closely by all its trains and baggage. Regular routes lead from Gundava upon Larkhana, while Dadur, besides being in direct communication with Gundava, is the place whence most of the roads diverge leading to points in the specified portion of the Indus valley.

Now, though this plain is poor, and though it requires a little experienced management to obtain a good supply of water from it, I would put it to you whether such an invading army as I have imagined could reasonably hope for more favourable circumstances in which to enter a theatre of war than those in which it would here find itself.

Pausing for a moment here, let us look back to the other side of the theatre, and suppose that an army is also moving from Caubul to the Indus valley. We know that it will advance in long processional order down the Gomal or the Khyber Passes—that it will issue at once through narrow gaps, into the presence of the defender's troops—that it will have, or ought to have, to fight with the heads of its columns even for the power of making its first deployments, and that when deployed the greater part of the army will have at its back, not practicable lines of supply, or of retreat, but impassable mountains. It will not be contested that this is a very different situation from that of the Bolan Army—in the one case we have an army issuing, in the form of columns, close to the enemy—in the other an army advancing on a full front with the enemy still at a distance. I conclude, therefore, that however the enemy may think it proper to distract us by feints or diversions here, the main line of advance will be on the Lower Indus.

Next, as to how we should meet the invasion. The port of Kurrachee is a point where troops and stores from England, from our Mediterranean stations, from Bombay, can easily and conveniently concentrate. It is also the terminus of the Indus Valley Railway, which, if not actually completed, is so near completion that I will take it as an accomplished fact. By rail, and also by the river, navigable for large steamers to beyond Sukkur, the readiest means exist of concentrating from home and elsewhere, as indicated, upon the Lower Indus. From Lahore, by Mooltan, the same part of the Indus is reached by rail—the communication across the river being by steamboat. And from Lahore also a railway now extending to, or beyond Jhelum, and which will shortly reach the Indus, affords a ready means of reinforcing Peshawur. This Indus Valley railway is not to be measured by the capacities of our English railways. It is only a single line, burns wood for fuel, and maintains but a moderate rate of speed. But, as it is, it is invaluable; it enables the Bengal troops to combine easily with those of Bombay, and it gives great facility for reinforcing either extremity of our frontier line. The Quetta column has already profited by it, having been conveyed by rail from Mooltan to a station opposite Mithun Kote; and all troops from Bombay or Kurrachee will also experience its benefits. And in a more momentous crisis than the present, such a one as I have been supposing to exist, we should bring our whole force to bear in this part of the theatre. In fact, there is, I think, no spot in the world where we could make such a military display of strength at short notice as on the Lower Indus. Thus, with the passes suitably guarded, the Army of the Lower Indus assembled beyond the river, the reserves at Lahore and Mooltan ready to reinforce either of our two Armies, we should be in a situation full of promise, and it was the consideration of it which caused me to express elsewhere the opinion that we ought, with good management, to give an excellent account of any foe who should attack us in the valley of the Indus.

But good grounds as there are for taking that view on our side, I

have also just endeavoured to show that the enemy's Army of the Bolan would meet us here under the most favourable circumstances that it could possibly hope for—its rear secured, its front open, its advance easy, and with a wide space of our frontier upon which to direct its operations. Moreover, it is to be observed that the railway so invaluable as our line of communication, and protected in its upper portion by the river, runs from Sukkur to Kurrachee on the right bank, and that we could scarcely hope, before having fought a decisive action, to guard it against the enemy's enterprises throughout the wide extent on which they would menace it. I will, therefore, now pass to the consideration of whether we shall not meet that enemy to much better advantage on a more advanced line.

The argument which is always put forward in support of the plan of remaining on the defensive is, that we should thus await amid our resources an enemy who would have advanced to a great distance from his. The argument thus stated would imply that it is always judicious to await invasion. But this is manifestly not true, for the majority of brilliant campaigns have been those of invasion. It is sometimes a judicious course, sometimes not. It is judicious when adopted by the weaker nation, deficient in the money, material, and organization which an offensive campaign implies, and at the same time possessing a frontier and a country topographically strong. But we certainly should not like to consider ourselves as likely to be the weaker party, either in resources or in organization, in the contest I have contemplated. Again, a defensive war will often combine the parts of an otherwise discordant empire in a patriotic union against the common enemy. But it is, I believe, the concurrent testimony of all Indians, that there is no territory on which it could be more perilous to give an enemy the chance of winning a battle than our Indian Empire.

Let us look, then, towards a more advanced line; and here our task is much simplified by the fact that we have already occupied Quetta. By doing so, it is *we* who are in the position of commanding an avenue into the enemy's country, and of securing the passes in our rear; while we have the further inestimable advantage of having reached the back of the mountain district—that is to say, of holding the issue of the frontier, and of seeing before us a country, not of course without its difficulties, but offering at the same time immensely increased facilities for skilled operations. We are thus, too, carrying forward our theatre of war out of our own territory, which we cover by our advance. And for communications, besides those before enumerated, the construction of the branch railway from the Indus to Dadur, already designed and officially talked of as intended, will annul in great degree the distance of Quetta from the frontier and remove any difficulties attending the march.

Looking next at the avenues *out* of Quetta, we find the high road to Kandahar, which offers no difficulty to the march of any column, except the Khojak Pass, the nature of which as an obstacle has, I believe, been greatly exaggerated. Another road to the left of it passes also over the Khojak range; and there is still another marked on the side of the desert. But, though our troops, in former campaigns,

frequently marched through that country, being in small bodies they moved only on one road, and we know nothing from actual observation of the two I have mentioned. There is another road which, branching north-east from the Kandahar road, a little way out of Quetta, traverses the hill country, and this, though very rugged, we know can be used by troops of all arms, for the Bombay division moved by it in the former war from Ghuznee upon Quetta. And what I would specially call attention to, lest you should think I had dismissed the subject of the passes too briefly, is that by occupying Quetta we practically close all passes to the Indus Valley which issue south of Dera Ismail Khan.

Strategically, then, I hope there remains no doubt of the immense advantage of holding Quetta, whether as a means of controlling Afghanistan or of meeting such a formidable combination of enemies as I have contemplated. Proceeding to inquire what tactical features it may offer, it appears that, on passing the Bolan, the road goes for some twelve miles over a waterless plain, before entering the cultivated district, also a plain, which surrounds the town. Quetta stands round an isolated conical hill which commands the plain behind it, but is itself commanded by high ground in its front. It became, therefore, of importance to know how this might be remedied: and I am informed by the very capable Officer who surveyed the district, that a mile or two in front of the town, and within Khelat territory, there is an excellent position, far out of reach of any other commanding ground, and dominating the valley beyond. This seems to be confirmed by a late telegram from there, which mentions an additional fort just constructed as having rendered Quetta quite impregnable. On the left of Quetta, between it and the desert, the line of hills is only passable at a single gap; and a similar range, not passable at all, exists on the right. Tactically, then, as well as strategically, for defence, as well as offence, against either a powerful or an inferior enemy, it would appear alike advantageous; and while the policy of taking possession of it has for many years been powerfully opposed, and while the measure was carried into effect almost unnoticed in this country, it appears, if the advantages are such as I have stated, that we have here the most valuable possession on which England has laid her hand for many a day.

Having got so far, however, the question is not yet settled of whether we have yet reached our most advantageous frontier. I have considered the confederated forces as within the triangle Herat, Caubul, Kandahar—the richest, most open, and most temperate portion of Afghanistan: and if they meant to attack us, whether in the valley of the Indus, or at Quetta, their position would be strong, and strong also against attack. Caubul would, so long as they might hold it, threaten Peshawur—and Kandahar would form a strong point of concentration for an advance. And the hostile Army so placed might, without imprudence, send an advanced force to occupy the Khojak Pass, the only very difficult or specially defensible part of the road between Quetta and Kandahar, about 90 miles from Kandahar, 60 from

Quetta, thus acquiring the option of receiving battle there, and, in case of its advance, the gaining of so much ground.

I will go on, then, to suppose that the result of our present operations is to give us the power, if we choose to use it, of occupying Kandahar, with a small space beyond it, necessary to complete its strategical value. The obstacle of the Khojak would thus disappear. At Kandahar, the richest district of Afghanistan lies before us. Several practicable roads lead from thence on Ghuznee and Caubul on the one side, on Herat on the other—and others lead from it down the Helmund to the Persian frontier and thence on Meshed, in the rear of Herat. The space beyond should therefore include a portion of the Helmund river, with the command of the passage at Girishk. Of the communications with Quetta I have already spoken.

It is to be noted that between Herat and Caubul, two of the great cities which I have supposed the enemy to occupy, lies the range of the Hazareh mountains, the road through which, between those cities, is so bad that the circuit by Kandahar, or by a route north of the mountains, is generally preferred. Hence another important consequence would follow from our occupation of Kandahar, namely, the rupture of the enemy's front; for if he occupied Caubul we could isolate the forces there from those at Herat—if he did not, we should be free to bring our whole strength to bear on the side of Herat. At Kandahar, too, we should hold such a position towards Persia as would seriously affect her relations with Russia; and finally, our presence there would be almost decisive against any design of the enemy to invade India through the passes. Observe, I do not say annex but occupy Kandahar, by friendly treaty, as we now occupy Quetta.

I think it is impossible to deny that our Army posted here, in a delightful climate, and with such strategical possibilities open to it, could desire no better field in which to contest with Russia and her allies the Empire of India. And perhaps many of you will think with me that the leader of that Army will be, in his opportunities, the most fortunate British soldier whom we have seen since Wellington.

Resting here, it becomes necessary to look at the other side of the strategical theatre, and to consider the question of an advance of our frontier-line from the Indus valley in that quarter also.

The road from the eastern issue of the Khyber to Caubul is marked by two chief difficulties. With those of the Khurd Khyber we are sufficiently familiar. Issuing from it a more open region presents itself, extending beyond Jellabadad.

The idea that some advance of our frontier might be expedient has come to be generally contemplated; this is tantamount in many minds to considering that any step forward must be advantageous; and one step that finds favour is that of pushing the frontier forward on this side to Jellalabad. One reason assigned for this is that we should thus command the valley which ascends from behind Jellalabad to Chitral. This point would never, I confess, have occurred to me had it not been indicated elsewhere; it seems to imply that we may expect the Russians that way. But what does such an expectation mean? It means that Russia, after pushing her forces to the sources of the

Oxus—after forming a secondary base or fresh starting point on the plateau of Pamir—after crossing the Hindu Kush—is to march 250 miles down this valley, and for what? If she desires to reach either Caubul or the Khyber, surely she will possess herself of a more direct and convenient route to those places. If she does, why take this? If she does not, is it to be supposed that she will enter on such an enterprise by such a line? But it will be seen that the case can be provided for in a general plan, and I will pass to the other reason that has been assigned, namely, that we should thus have secured the passage of the Khyber. Now, the permanent occupation of a point beyond that pass must have either a defensive or offensive object. First, as to the defensive. If a point in advance of the Khyber were the knot where a number of roads united which led from thence into the Indus Valley, the policy of occupying it would be obvious. But it covers nothing, and commands nothing, but the pass itself. Now the difficulty of supply by such a road would prevent a very large force from being permanently posted there. On the other hand there is nothing to prevent a powerful enemy who may possess Caubul from bringing any force he pleases to attack the permanent post in advance of the Khyber, which must then be reinforced if possible from the rear. Nor would the difficulty be remedied—on the contrary increased—if our defensive post were pushed further, through the pass beyond, to the Caubul valley; a measure which, I believe, nobody has ventured to propose. On the other hand, if the reason for proposing to take up such a position is that we should thus have accomplished a step towards obtaining entrance into the district beyond the mountains in an offensive campaign, we must remember that between that district and Jellalabad there are many difficult marches and at least one most formidable pass. None but a strong and well-equipped force, in fact an Army, could venture thus to menace such a fortress, with such support beyond it, as Caubul would present under the circumstances I have imagined.

Now it is to be noted that an Army here would be separated from an Army on the Lower Indus by at least 500 miles—from one at Quetta by at least 700 miles—from one at Kandahar by 850 miles. The British armies would, therefore, be under separate commands, and operating with distinct objects; nor could they combine except after important successes gained within the enemy's territory. The enemy, on the other hand, would possess the advantage of operating from a common centre against widely separated bodies advancing towards that centre. In fact, considering the difficulties of supplying this Khyber Army, we should be voluntarily adopting, in its worst form, the double line with all its disadvantages, and without the excuse of necessity, since we could throw our whole weight with full advantage on the other side. I think, therefore, there is much to be said against, nothing for, the occupation of a post beyond the Khyber, and that it would be a source not of strength but of weakness.

In saying what I think should not be done, I am prepared to say what I think should be done on this side; and it is satisfactory to me to think that the alternative plan, while, in my opinion,

the best in the military sense, involves no extension of territory, no expenditure worth mention, and no increase of frontier force. It consists, first, in blocking the mouths of the Khyber on our side of it with an intrenched camp armed with powerful artillery, to be garrisoned by the Peshawur troops, reinforced in case of need. If this were suitably occupied, I cannot conceive how an enemy's force, however superior, advancing, as it must of necessity, in lengthened, even straggling, array to the mouth of the Khyber, could expect ever to issue from it. It seems to be one of those cases where a fortress, often so doubtful an expedient, would be absolutely effectual. By fortress I mean those lines of works about a central work, that combination of fortress and camp, affording space for the manœuvres of its garrison, which modern engineering science considers the best kind of stronghold. And to view the matter by the light of comparison, let us suppose an attempt to secure the other end of the frontier, in Sind, with its 150 miles of flat front, by means of fortresses. It is evident that in that quarter a single fortress would not suffice—a system of fortresses would be needed, such as would swallow up an army. But in front of the Khyber a very moderate force in a single line of works would answer the purpose.

In like manner, an intrenched camp armed with heavy artillery might be placed at the issue of the Gomal Pass and occupied by the garrison of Dera Ismail Khan; and another, though rather to strengthen the feeling of security than from necessity, in front of the Kurrum.

To complete the system of defence, these posts should have in their rear protected passages over the Indus, connected with the railway by branch lines.

It is necessary to notice the plan of sending troops up the different passes and occupying the crests by way of advancing our frontier. Now I scarcely think that those who propose it have considered what it would be to maintain permanent posts on those inclement crests, with only such lines of communication and supply behind them as the valleys afford. And considering them as a preparation for subsequent operations in a campaign, we should, in using these passes for an advance, be operating not by double but by quadruple or quintuple lines of operations. Surely it would be nothing short of criminal thus to fritter away our strength when we can unite our forces, under a single leader, on the side of Quetta or Kandahar.

To leave no alternative untouched, I will now suppose that we have pushed through all the passes, made the mountain territory ours, and placed our posts on the road from Caubul to Kandahar. Let us consider for a moment how an extensive frontier is generally guarded. The line of communication between the posts should pass not through, but behind their front. Any of them when driven back should have secure lines by which to find support from others, and all when retiring should possess, in numerous roads, the means of concentrating upon important points. But what of this do we see in our supposed new frontier? There we have bodies widely apart, isolated by the first advance of the enemy, each with its own narrow pass to retire into—entering which it continues to be isolated from the others for weeks,

till it emerges, still at a great distance from them, in our present territory. I trust we shall not incur the charge of such a vast extent of barren territory, with its savage populations, for such a result as this, and that our notion of a rectified frontier will not include any of these isolated lines and posts thus unmeaningly thrust forward into the mountains. Any good that could possibly be hoped for from them would be much more effectually accomplished by the force at Kandahar.

Apart from the question of a more formidable foe, it appears to be believed that these posts pushed up the passes would lessen the chances of future contests with the unruly hill-tribes. That they are unruly would appear an excellent reason for keeping them in our front rather than in our rear. Posts separated by such distances and such inaccessible country, can exercise no influence on the inhabitants between; on the contrary we should thus be offering them new and potent means of molesting us. I fear that slenderly-escorted convoys would offer irresistible temptations to the half-starved hill-tribes. Such a measure then, in time of war most mischievous, as multiplying chances of disaster, would be in time of peace costly and burthensome, for it would not in the least obviate the necessity of keeping up our present line of frontier guards.

When, in the former war, our forces moved on Kandahar, the tribes of the south were no less hostile and mischievous to us than those of the north, and every march from the Bolan to the Khojak was marked by their depredations on our trains, by the slaughter of their conductors, by the murder of stray soldiers and numbers of defenceless camp followers. But a few years afterwards they were rendered thoroughly peaceable and friendly by vigorous handling and judicious management. At least one most distinguished Officer who took a leading part in the process still lives to tell us what the process was. It might be worth trying on other parts of the frontier; however that may be, the result for us, and one well worth taking into account, is that, to all appearance, our trains march as safely now from the Indus to the Khojak as from London to Aldershot.

The plan, then, to which I arrive at the end of this train of reasoning, has at least the merit of simplicity. The camps in front of the passes become the fixed pivot of operations: the main forces, assembled in the first instance where they can most easily assemble, that is to say, on the Lower Indus, are the active army. As I have said, I should feel confident of the result even in the valley of the Indus; I think our position vastly improved by the occupation of Quetta; but I should think it all we could desire if we occupied Kandahar. And whichever of these two points we select for the advanced post of our line it must be made the site of an intrenched camp powerfully armed, the railway to Dadur must be made, and the roads between it and the camp everywhere improved.

There is one case in which the garrison of the camp watching the Khyber might cease to be merely a defensive force. If, in the course of the campaign, as is likely, the Kandahar Army or part of it should

invest Caubul, the troops might come though the Khyber to join in the siege and probably in subsequent operations.

Thus, then, I have endeavoured to sketch a definite plan upon which to concentrate our resources, and by which to secure a scientific frontier, and a permanent settlement of this large question. Looking at the northern half of this part of our territory, I think we should be thankful for possessing a frontier so easily rendered impregnable. Looking at the southern half, we have no less reason to be thankful for having acquired, in Quetta, such means of vigorous and effective action, and such an opportunity of securing new advantages of the most important and decisive kind. With a garrison strongly posted in its lines at Kandahar, with all the routes and stages by which our forces might be assembled on that point, all sources of supply, and all arrangements for transport, laid down, as our trained Staff Officers are certainly capable of laying them down, we might view calmly any possible complications before us, whether arising from the augmented military power of Russia in the East, from the success of her intrigues, or from her open hostility. The grounds of our assurance would be manifest and easily understood, our native subjects would soon learn to appreciate them, and what would be security for us would be tranquillity for India.

Major-General Sir FREDERIC GOLDSMID: Having been myself on two missions, one connected with Persia and Beloochistan, and another with Persia and Afghanistan, I know much of the western frontier of the latter country from general observation. As regards the eastern frontier of Afghanistan, my acquaintance with the subject is strengthened by long residence among Afghans, Beloochis, and people of the countries in the immediate neighbourhood, especially in Upper Scinde and Kurrachee. I have, moreover, long felt very great interest in the question of our Indian frontiers in the north-west, and have made it, more or less, a study. With this, therefore, and some other claims, however small, to express an opinion on the subject, I venture to state my thorough conviction that what General Hamley has proposed is exactly what we ought to do. I do not, indeed, know of a single objection that can be raised against his scheme, which has been so clearly put forward that it could hardly fail to be intelligible to all hearers. One very important advantage in holding Candahar is that by so doing, we really hold the main line of communication between Cabul and Herat. There may be another route to the north of the mountain chain, by Maimana; but it is rather roundabout, and probably not so secure and frequented as that by Farrah, Candahar, and Ghuzni. The road between Herat and Cabul by the Hazareh country is passable, and I believe troops have proceeded that way. I have been looking only this morning at Conolly on the subject, and have examined it by the light of maps. It is hardly, in my opinion, a direct route. From Herat its course is apparently to the south-east; it then turns up as if it were going to Bokhara, and then inclines towards Cabul, and joins the road which leads from that city to Bamian at a place called *Gardan-i-Diwar*. But I do not think that that road need really be taken into account, because it is a very difficult one—not only physically difficult, but difficult on account of the nature of the tribes through whose country it passes. There are, for instance, two sets of Hazarehs, the Sunni and the Shia divisions. To conciliate the one would not necessarily be to conciliate the other.

Lord WAVENEY: Those who have read the debate which has just taken place in the House of Lords will remember an exceedingly happy illustration, given by the Lord Chancellor, of the topographical circumstances of Afghanistan, in which he drew his parallel from Scotland. He requested his audience to consider that they have before them a large mass of mountains, such as the Highlands of Scotland represent. I derive from that illustration an opportunity of observing how old matters repeat

themselves, and how, when the new is ingrooved into the old, under the circumstances which have been presented by our lecturer, we may infer, from previous success, a success for the plan which he has proposed. Now it will be observed by those who are familiar with the circumstances of the mass of mountains of Scotland that those mountains were inhabited, in the old times, by tribes answering in their warlike character, as distinguished from those inhabiting the low lands, to the mountain tribes of Afghanistan, as distinguished from the dwellers by the Indus; and it will be recollected, that one of the great difficulties of the English Kings in the annexation process going on, was to deal with these tribes; and practically Edward I and his successors adopted the same principle for the permanent and sufficient mode of disposing of the disturbing force from the mountains as is suggested at the present moment by General Hamley, in closing the passes. It will be observed by those who have travelled on the seaboard and the inland great estuaries and rivers of Scotland that, at all points where a *débouché* from the hills might give opportunity for the northern clans to pour into the low lands, there is to be found a castle, not of ancient sea rovers, but a castle of the Norman military system. These castles show, by their position, what they were intended to do, and they had the effect for which they were designed, and in those castles I see the prototype of the fortresses projected by General Hamley. There is one point, I confess, on which I have always had considerable doubt. I suppose no Officer here present will recollect the battles of the Mysore and the irruption of the Mahrattas and Pindarees down the Western Ghauts into the plains of India, but I have heard old men describe the continued terror in which the plain countries were kept in the days when the Pindarees rode up to the gates of Madras. Where you have a mountain range beyond which the eye cannot penetrate, where you have not the means of acquiring satisfactory headquarter information, you will be continually vexed and harassed by the apprehension of what forces of aggression may be coming on its way, and what may be prepared behind that screen. If, therefore, this plan of barring the outlets, which has been adopted particularly in some portions of the Tyrol, be only a barring of the mountain outlets, I say that will be insufficient. It was very well remarked, by a very distinguished statesman in that last debate, when he said that we not only wanted the rectification of frontier, but we wanted to have eyes to see and ears to hear. One of the great troubles and difficulties of late years has been that continual permeation of hostile rumours through the defiles, greater or smaller, of the mountains of Afghanistan. But when the point of observation is projected into the plain, and represented by the intrenched camp at Candahar, we turn the mountain screen and see the glacis of the fortress. I quoted on the last occasion the illustration given by a German writer, that the north-western frontier was a fortress of which the glacis was not in the possession of the garrison. Now, we all know, if our artillery fire is to be worth anything, we must see the foot of the slope. We see along the reverse of the slope, as considered from the Indian frontier, from the outlook or *guérite* of Candahar, and therefore the occupation of Candahar has an especial value. And it has this especial value: it must draw upon it in advance the attack of the enemy. We know what is the objective point of any force coming from the north-west; and it has occurred to me, on looking at the map, that a double advantage may probably be given by a road marked as abutting on the sea to the westward of the line of Kurrachee, that passes through Bela, and gives us a double access to our natural base, for the natural base of British war is the British fortress in communication with the sea, whence must come our stores. Woolwich should always be within reach of Kurrachee. It is at present. I have no doubt that the slopes of these hills within the territory of the Khan of Kelat may be made an additional line of defence; therefore, as a means of keeping the aggressive force within its boundaries, as a means of seeing what is projected beyond our boundaries by a force that may become aggressive, I cannot but believe that in its simplicity this plan deserves most thoroughly the support which I am sure it will receive from those present, and will command the intelligent appreciation of the country.

General Sir GEORGE MALCOLM: I should be glad to know how we should protect our flank if we took up Candahar as an advanced post, and if it is not necessary that we should have positions in Eastern Afghanistan in order to secure moral influence

over its tribes and make them our allies? I fancy that a passive defence is the weakest defence that we can possibly have. What has been said by General Hamley suggests to me that we would have, as it were, half our frontier passively defended and the other half actively defended. It seems to me that the tribes of Eastern Afghanistan could roll down on our communications between the Bolan and Candahar if we did not gain an ascendancy over them, and I do not think that a passive defence would be sufficient either to establish our influence over that part of Afghanistan or to maintain it when it may be established. Perhaps some Officer may throw some light on this point in reply to what I have said.

Major-General Sir HENRY GREEN: I think that with regard to the general question of the strategical conditions of our Indian frontier, General Hamley has left me nothing to say, I entirely concur with him on every point. With reference to the questions asked by Sir G. Malcolm, I should hope that after the conclusion of the present campaign we should find ourselves again on friendly terms with the Afghans, in which case we should not, I consider, require in any way to meddle with Cabul. Holding Candahar, as suggested by General Hamley, and a narrow strip leading from Quetta to that position, I would leave to the Afghans the whole of the rest of their country, interfering with them as little as possible. Under such conditions I should have no fear for our communications with our own territory as far as Quetta. They would pass through an entirely friendly State, and thence to Candahar there are no tribes likely to give trouble under proper arrangements. With regard to the Punjaub frontier we must entirely separate its defence from the raids of the tribes inhabiting the Suleiman range of mountains, from the possibility of an Army of a powerful European State debouching into the plains with a view to attacking India. To meet the latter contingency General Hamley proposes the construction of strong fortresses at certain strategical points; to meet the former I would suggest the formation of a line of outposts along the whole frontier running close under the mountains connected by a broad, bridged road, and that all our own subjects residing within this line should be disarmed with a view to putting an end to the blood feuds which are carried on between the tribes residing in the mountains and those in the plains, and the continuance of which are one of the causes that lead to raids within British territory, and tend to keep the frontier in a constant state of excitement; but in taking away the power of retaliation from our own subjects, we must be prepared to afford them protection, and for this purpose the present strength of the Punjaub Frontier Force is insufficient and ought to be raised from 12,000 to 20,000. I would also suggest that every inducement should be offered in the shape of free gifts of land, &c., to the mountain tribes to settle with their families in British territory. Such a plan as that I have sketched has been tried and found to answer, certainly on a smaller scale, on the Scinde frontier; but no doubt to have to deal with hostile tribes aggregating some 170,000 armed men who acknowledge no central authority, and owe allegiance to no one, not even to their own tribal chiefs, except in a nominal form, is a question extremely difficult to deal with. I however entirely concur with General Hamley that such foes are far better in our front than in our rear, and that to push forward military posts amongst them would only aggravate the present unsatisfactory state of affairs. In conclusion I would add that with a British force stationed at Candahar, the Afghans friendly, and an Afghan garrison holding Herat, assisted by a few selected British Officers, we might contemplate without fear any movements of Russia in Central Asia having for their object an attack upon our Indian Empire.

Major-General FYERS: I think, Sir, that the very interesting lecture and scheme of defence which we have heard from Major-General Hamley covers to a great extent my own feelings and views in this matter, and that this important road from Candahar by Ghuznee to Cabul must always remain, in the eyes of military men, as the chief strategic line of operation in opposing an enemy coming from the north-west. I think there can hardly be a difference of opinion on this point; other approaches and passes there no doubt are, but I feel sure that the approach into Afghan territories by the Bolan and by Quetta is that which will at all times be most suitable and least open to objection of any kind. General Hamley has pointed out the very superior claims which Candahar has over any other position for strategic purposes, principally of a defensive character; and in regard to this, I do not think

there can be two opinions, for when you are at Candahar you are on the high roads either to Cabul or to Herat. In regard to the grand series of mountains and valleys between the Bolan Pass and the Suffaed-Koh Mountains, and again from that range to the independent territory of the Kafiristan valleys, I do think that a complete change in our policy is desirable. My friend Sir Henry Green, with his large experience, thinks otherwise; he still approves the policy of holding entirely aloof from all the tribes in those mountains, and of regarding them as impracticable barbarians. Now I cannot but regard with suspicion and dislike a policy which proposes for all time to entertain for these people those undying sentiments of suspicion and of armed hostility; I feel compelled to believe that an honest desire for their improvement would command the means of insuring that improvement; and that what may now seem to appal in such an endeavour, would with each succeeding year yield to the strong compulsions of an organization having for its ultimate aim their good, and the well-being of their descendants. Whether this task is difficult or not, I think it ought to be carried out for our own sake, as well as for the people who are our neighbours. At the close of this present war, Afghanistan must of necessity become a protected state of the British Empire—a position which we cannot escape from; and whether we like it or not, Afghanistan must come under our guardianship and our tutelage. The sooner we recognize this to its full extent, the better for us and for them.

Lieutenant-General Olpherts, V.C.: I am aware that it may appear presumptuous on my part to address such an assembly as this, particularly if my remarks should seem to differ from those of such an able authority on military strategy as General Hamley; and I am also conscious that everything bearing on the political aspect of the question before us, must in this Institution be avoided as much as possible. Nevertheless, when I say that I am no politician, and am free from all party bias, and considering that I am at any rate an older man than General Hamley, I trust you will grant me your kind indulgence. It is now nearly forty years since I went out to India as a boy—and at that time the first Afghan war was going on, and my relative, Sir William MacNaughten, was the Envoy there; and had he not been killed in time I probably should have been sent up to join, and should have been killed with him—so that the question of Afghanistan was deeply impressed on my mind in my younger days, and that impression has remained ever since. I was also fortunate enough in those days to encounter men of note—among others one whose name should send a thrill of emotion through this meeting, I mean, of course, Eldred Pottinger, of Herat celebrity. Herat was considered then, and it always must be, the key of India from the north-west; without it we have not proper military possession of India. The Hindu Kush is the natural boundary of India; its very name denotes this. No doubt, arrangements, good in themselves, may be made of a temporary nature; but, depend upon it, the proper military boundary of India, if we are to stop short anywhere in that direction, must include Herat and Cabul, by which means we shall control Persia on our western side, and keep Russia at arm's length, and not otherwise. I quite agree with General Fyers in what he says, and I can see he is of the same mind as I am, only, perhaps, he does not care to speak as audaciously as I may be doing. I say that, to admit for a moment that Russia is to be allowed to descend into the plains and valleys of Afghanistan before we meet her, is, to my mind, utterly wrong. We must never dream of such a thing. We may hold back from annexing Afghanistan, but I think the best thing we can do for the Afghans themselves, as for our own political and military supremacy in India, is to annex and incorporate that country with our Indian Empire. I told a brother of Lord Lawrence, who, I regret, has committed himself to a different opinion, when he asked me what we should do, "Take "Afghanistan, and keep it." This I said at the outset of the controversy, before war was declared, and I have never since swerved from that opinion. On the contrary, it grows stronger with me every day I live. Depend upon it, we shall make the Afghans far better friends of ours if we do so; we shall only irritate them by half measures, such as taking Candahar, and blocking them up in the Khyber and other passes (on the wrong side, by the way). Are the tribes around Peshawur friends of ours? I was with Sir Charles Napier in his hill campaign in Beloochistan, also with Sir Neville Chamberlain, in an expedition against the Wuzeerees in the Kurrum Valley, and likewise with Sir Colin Campbell and Sir Sydney Cotton in the

Peshawur Valley, and can therefore speak from experience of the frontier tribes. You cannot put your nose safely out of Peshawur in the most peaceful times. Are we to go on for ever in this state? It is intolerable that we should have to do so; and the only effectual remedy is to "take Afghanistan, and keep it," when India will be perfectly quiet and tranquil, and the Russian boundary, if need be, conterminous with ours. Our true glacis is on the other side of the Hindu Kush down to the Oxus; and anything short of that I consider unworthy of the dignity of the British Empire!

In conclusion, I would beg to disclaim any idea of arguing with or pitting myself against such an able lecturer and strategist as General Hamley, who, if I attempted to do so, would doubtless soon "turn my flank and stop up my passes!" and, not to trespass too much on your kind consideration, I will now sit down.

General Sir EDWIN JOHNSON, R.A.: I have listened with extreme interest to what General Hamley has said, and I can only regret that his observations were not more extended, and that he did not go further into details. I do not know whether General Hamley is aware that we have occupied Peshawur for nearly thirty years, and that we are yet debating what description of fort we ought to erect there. I should like to hear a description of the nature of the forts and works with which he proposes to defend the entrance to the passes, whether they are simply to be considered with reference to the frontier tribes, or whether he anticipates a more formidable foe. It would be advantageous if General Hamley would inform us whether his strategical arrangements are designed for the purpose of meeting the aggressions of our old tribal frontier foes, or whether he has in view a new and more formidable enemy. The financial question of our frontier defence is a very serious one, and our chairman, Sir Henry Rawlinson, will bear me out when I say that, mainly on financial, though partly on sanitary grounds, we have been nearly thirty years deciding whether we shall have a fortified post at Peshawur or not. I should be very sorry to think that another thirty years will be spent in debating what works shall be erected for the security of our rectified frontier. I put forward those remarks in hopes that we may have a little further information on this point, which, however, I am quite aware is a tactical rather than a strategical one.

Major-General HAMLEY: I thought I had made it quite clear that the works I had proposed to establish in that place were against the most formidable enemy we could expect, and that if those works were such as to provide against that enemy they would so much the more provide against any incursions of the hill tribes. I quite concur with all that the different speakers have said about the policy of improving the condition of those tribes. It seems to me a positive duty on the part of a country like ours that, when we come in contact with uncivilised people, we should leave them better than we find them. But, while strongly of that opinion, I do not myself in the present case want to see the Afghans converted by sending military missionaries up the passes. I dare say General Olpherts will excuse me at this advanced stage of the discussion from following him into the recesses of the Hindu Kush. I will only observe, in reply to him, that the plan I proposed for placing those works in front of Peshawur at the issue of the path would close all the passes of the mountains, whether in the Hindu Kush or elsewhere, inasmuch as those passes debouch into the one of which I spoke. As to the nature of the works to be placed there, which formed the subject of Sir Edwin Johnson's question, of course, he knows, as well as I do, that it is impossible for anybody not on the spot to tell precisely what description of works would suit the ground; but we all know what an intrenched camp is, and I have not the least doubt that there are a hundred engineer Officers now in that country who would in a week provide a plan which would sufficiently answer the purpose. In conclusion, I have only to say that deeply impressed as I am with the truth of the views I have expressed, it has been the greatest gratification to me to find them receive the sanction and authority of so many distinguished Officers.

The CHAIRMAN: With my very limited practical experience of the art of war, the former Afghan campaign being the only occasion on which I have seen any active service in the field, I feel it would be unbecoming in me to examine in any detail the professional views which have been put forward by General Hamley, and which have been generally approved in the course of the very instructive discussion

which has followed. But perhaps I may be allowed to state that approaching the subject from an entirely different point of view—that is, not exactly from a political, but from a general common-sense point of view—I concur, and always have concurred, with the views which General Hamley has expressed. It has, indeed, always been my opinion, since I first turned my attention to the subject, that it was our true policy to look to western Afghanistan, that is to Candahar and Herat, rather than to Cabul, and if I may be allowed to read a very short extract from what I wrote fourteen years ago, you will see that I then put on record opinions identical with those that have now been presented to you by General Hamley. I then said, "If Russia should take possession of the Oxus as she has already taken "possession of the Jaxartes, then as her outposts would be in contact with Afghan "outposts it would become a question for serious consideration whether, leaving "Cabul and Ghuznee, the scene of our old disasters, to struggle on in isolated "anarchy, it may not be incumbent on us to secure a strong flanking position by "the occupation of the open country of Quetta and Candahar, and even of Herat." I further said, "The time may come when it will be our duty to remember that "outworks are as necessary to the defence of Empires as of fortresses, and that "in this view Herat and Candahar are the Malakoff and Mamelon of our position "in the East." Now, without troubling you with details, perhaps I may be allowed briefly to state the reasons which led me to that conclusion. Cabul is, probably, as awkward a place to hold and to govern as any city in all Asia. In the first place, the capital and its neighbourhood are inhabited by a fanatical and disorderly population, incensed against us by the memories of the former war, who yield a very doubtful obedience even to Shere Ali himself, and who would, of course, be still more unmanageable under any attempt at coercion on our part. I always felt, therefore, that it was desirable, if possible, to give such a place a wide berth, and General Hamley has now, I think, very satisfactorily pointed out that such a course is possible, since Cabul, if left to itself, can do us no harm, provided that we are strong at Candahar; and that we also shut up the Khyber Pass so as to close all outlet for the discontented and hostile spirits at Cabul to emerge upon the plains of India. At Candahar, on the other hand, I desire to impress upon the meeting that everything is in our favour. The people in the town and country around are in very few instances real Afghans—they are Parsiwans opposed to the Afghans in race, in language, and in religion, and they have always been most friendly to us. The climate again is healthy and agreeable, supplies are abundant, and there would be no more difficulty, in a military point of view, in our holding Candahar than in holding any ordinary cantonment in the Punjaub or in Scinde. The military position of Candahar is, moreover, admirable. General Hamley has already drawn attention to the fact that it intercepts the line of communication between Herat and Cabul, but it does much more: in the first place it supports Herat in a very effective manner; for, supposing us to be in possession of Candahar, with a railroad laid down as far as Dadar (and possibly to be continued through the Bolan Pass and on to the Afghan plateau), we should be in a far more efficient position to succour Herat than Russia would be in to threaten it from her remote base on the Caspian or Aral. Again, the possession of Candahar would render any attack on India from the Hindu Kush almost impossible, either by Cabul and the Khyber, or by Ghuznee and Kurrum, since our position at Candahar would flank both lines. Another point to be considered is that Candahar is in the direct line of attack; for if an army ever should invade India from the west or north-west, it would certainly march by the line of Candahar, where there are no mountains to be crossed, and no physical difficulties worth speaking of to be encountered, the great line of the Hindu Kush being turned, and the country being so flat and open that a carriage may be driven with comfort from the Helmund river to Teheran. There is hardly in fact a hill of 100 to 200 feet in height on the entire line, and if an invasion of India is ever to be attempted, it would certainly therefore be conducted by that route. I fully agree also with General Hamley that strong entrenched camps, not of course of the size of Metz, but of that description—not only fortresses, but large intrenched camps in addition, capable of holding a force of 10,000 or 20,000 men; such camps, I say, at the mouths of the passes would render our position in India perfectly impregnable. There are two or three smaller questions on which I am not prepared, perhaps, to

give in my adhesion as completely as General Hamley would wish. I think, for instance, it is still a question whether, putting aside the idea of going as far into the interior as Jellalabad or Ghuznee, it still might not be desirable to hold the passes by a small post at the upper end, as well as the intrenched camp at the lower end. This is a minor point, I know, but it is one in which my mind is not entirely satisfied with General Hamley's scheme. The holding the Khyber, for instance, by a small post at Dacca, as well as by the large camp at the southern entrance, would give us a command of the whole length of the pass, which would be invaluable for the protection of trade and for general passage; whereas, if we only held the lower mouth of the pass, we might be perfectly safe and strong strategically, but we should be neglecting those legitimate calls on our protection which the position would seem to require. In the same way, I should be very loth to restore the Kurrum Valley to the Afghans. How far the Peiwar Pass can be held by outposts at the upper end of the valley I cannot attempt to say, but the valley itself is certainly a very desirable position, since the inhabitants are friendly and the soil is fertile, and the geographical situation is certainly of value in enabling us to locate a force within a very convenient distance both of Cabul and Ghuznee. Although I may disagree with General Hamley on small points of this sort, I am bound to say that, in regard to the great general question, we should not attempt to occupy the whole country of Afghanistan, but should rather block up the eastern defiles by intrenched camps and merely hold the western part of the country in military strength; on that broad question I am entirely in accord with him. I think it is hardly worth while to go into the still larger question which has been put forward by General Fyers and General Olpherts. To step at once from the plains of India to Kafiristan and the line of the Hindu Kush is such an enormous stride in advance that it almost takes away one's breath to think of it. We certainly could not take up that line of frontier and defend it without an enormous increase to our military strength, which would entail extra expense of a million or two millions a year, and in the present state of the finances of India, I really do not see where the money is to come from. I would beg, gentlemen, to remember that in all matters, military as well as political, we have to regulate our proceedings according to the old maxim of "cutting your coat according to your cloth." With an impoverished exchequer we cannot branch out into theoretical or sentimental lines of frontier. We cannot occupy the line of the Hindu Kush, although upon the map such a frontier may appear very symmetrical and very desirable, with any ordinary regard for the resources of India. India cannot afford it, and I am obliged, therefore, to confine my line of vision to something less ambitious, but more practical, to measures of defence less expensive, but, as I believe, thoroughly sound and scientific, such as have been treated of by General Hamley. I will only further say that, whatever our military action may be, either in the passes adjoining our frontier or at a distance in the plains of Candahar, I feel satisfied that our influence and our presence may be made most beneficial, not to ourselves only, but to the people of the country. Wherever we have already established posts along the frontier of the Afghan hills, we have exerted a most civilizing influence on the tribes of the neighbourhood; and it has often occurred to me, arguing from this experience of recent years, that if we had only continued to have held Afghanistan from the year 1842, when we needlessly abandoned the country, and to have exerted the same kindly beneficent influence that we have exerted in the districts below the hills, I believe the greater part of Afghanistan at the present day would be as orderly, as quiet, and as flourishing as the happy provinces of the Punjaub and Sinde. Remembering what might have occurred in the past, it is a pleasing prospect to look forward to something of the same sort in the future. I will, in conclusion, ask you to pass a vote of thanks to General Hamley.

Lord ELCHO: Before we close, I should like to put a question. The question of Herat has been alluded to in the discussion upon the very able paper to which we have listened. General Hamley proposes that the extreme point we should occupy in this so-called rectification of frontier should be Candahar. General Olpherts said that Herat was the key to India, and I believe Russian opinion is the same. I have a correspondent in the East who is in frequent communication with the Russians, and he informs me that they speak extremely freely to him upon various points, and

that they are unanimous as to the value of Herat. They further laugh at those English who are deluded into the belief that they (the Russians) eventually have no designs upon India. He further says that they look upon it that it must turn upon who can get first to Herat. Now we have heard, from our Chairman, whose most able paper upon the political aspect of the question, which is published in the Parliamentary papers, contains all the law and the prophets on this subject, that about the time when that paper was written, he considered Herat and Candahar as the Malakoff and Mamelon of India. Now the Malakoff, we all know, was more important than the Mamelon, and I should like, as General Hamley has only occupied the Mamelon, which is Candahar, to hear from General Rawlinson that he is still of the opinion which he expressed, ten or twelve years ago, that it is as essential, with a view to our safety, that we should occupy Herat as that we should occupy Candahar.

The CHAIRMAN: I purposely avoided touching on the question of Herat, except in general terms, on account of the extreme difficulty of discussing it. I think that General Hamley proposed, or foreshadowed the possibility of, our supporting Herat from Candahar. Candahar is necessarily the first stage of our proceedings, and I should be almost inclined to say "Sufficient unto the day is the evil thereof." At any rate, we must occupy Candahar in the first instance. If the necessity arises, and it may arise, I then would venture on a further advance from Candahar to Herat, but I must be allowed to repeat the qualifying clause "if the necessity arises." So long as Herat is not threatened, I think it would be very rash, and in fact needlessly offensive, to thrust a force nearly 400 miles in advance of Candahar, an advance which would cause great additional expense in keeping up the communications. It would, moreover, keep us more or less in hot water with all our neighbours. But I have no hesitation in saying that rather than Russia should occupy Herat, I would imperil the safety of India, in order to gain possession of it. I would give up all the rest of Afghanistan rather than that Herat should be in the hands of Russia, but so long as it remains in its present condition in the hands of the Afghans, independent of Persia and independent of Russia, so long I would not in any way interfere with it further than by giving it our moral support from our advanced position at Candahar.

NOTE BY COLONEL SIR WILLIAM MEREWETHER.—General Hamley's estimation of the value of Candahar to the holders of India is certainly most sound. Candahar is *the* strategic point. It not only forms the best position from which to advance to Herat when necessary, and to afford support to the occupiers thereof; but no hostile force could dare to venture on attempting an approach to India by Kabool and the Khyber while we hold Candahar in strength. Candahar thus held would do away with the necessity of the proposed large fort at the mouth (eastern end) of the Khyber Pass. Candahar has other great advantages, viz., in facility of communication with its bases. Between it and Quettah the country is easy of transit. There is but one pass, the Khojek, which sappers would soon make practicable for wheel traffic. The inhabitants have always shown themselves most friendly towards us, and, we hear, are doing so now. Quettah commands *all* the good roads from Afghanistan to the sea—not merely that by the Bolan, but the others by Kelat and the Moola Pass to Gundava, and by the hill route through Beloochistan to Soonmeanee and Kurrachee. Our influence in Beloochistan being now secured, all these roads are perfectly safe. From Quettah to Dadur is but 84 miles, of which some 60 are through the defile of the Bolan, a good road for a mountain pass. Beyond Dadur to the sea, a distance of nearly 450 miles, mainly through British territory, is all dead plain. Railway communication already exists for more than 300 miles of this distance, from Sukkur on the Indus to Kurrachee, and a few months more should see this extended to Dadur. The immediate base for Candahar is unquestionably Kurrachee. It is the nearest and most quickly reached. The connection is complete and safe. All the resources of the Bombay Presidency, with which it is in easy (two and a half days) communication by sea, can there be readily availed of. And at the same time every facility exists for extending the

call for the best munitions of war and reinforcements to Woolwich for the first, and to the home garrisons for the last.

The troop-ships leaving Portsmouth could reach Kurrachee in 30 to 34 days. Kurrachee is 180 miles nearer Aden than Bombay is. The harbour at Kurrachee, since its improvement, has 28 feet of water on the bar. This will allow of the above ships entering the port at any time during the fair season—also the trooping time—from October till May. Troops and stores would then be placed on the railway, and could be conveyed to Sukkur in twenty hours. In addition to the railway, the River Indus can be used for the conveyance of stores. There is a fleet of steamers on it, each of which tows two large cargo barges, and the trip from Kotree to Sukkur is made in six to twelve days, according to whether the river is high or low. There are no difficulties in navigating the river in this part. With rail and river combined, the transport of stores of all kinds would be most easy and expeditious.

OCCASIONAL PAPERS, NOTES,

AND

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RUSSIAN TORPEDOES ON THE DANUBE, AT SOUKHOUM, AND AT BATOUM (*Concluded*).

Translated from the *Revue Maritime et Coloniale*, by Lieutenant J. E. Meryon, R.N.

In this paper we shall continue the series of affairs in which, during the Russo-Turkish War of 1877–78, torpedoes have played an important part; there are four accounts to be added to the previous ones; the unsuccessful attacks being more numerous than the successful. We shall find employed—spar, towing, electric, automatic, and Whitehead torpedoes. We have obtained information in certain cases from English sources.

We have tried to separate truth and fact from exaggeration. Often this was not without much trouble, when the sources of information vary as to the number of torpedoes fired, when they describe as exploded in contact torpedoes which were fired too far from a ship to do any damage, or when they state that a Whitehead reached a vessel, when everything tends to show that the torpedo was fired by the nose striking against some rocks, and that it passed under the ship.

We again meet the familiar names of Makaroff and Zatzarennyi. The former, a Lieutenant at the outbreak of the war, had been within eight months successively appointed Lieutenant-Commander, Captain of 2nd Class, Aide-de-Camp to the Emperor, and decorated with several orders. The Russians know how to reward good services.

1*st. Day affair of the* 23*rd June*, 1877.

At the time that the Russians were preparing to cross the Danube at Simnitza, they endeavoured to rid themselves of the Turkish monitors, which, anchored under the fortified places on the river, such as Rustchuk, Silistria, Widdin, Nicopolis, hindered the preparation for this enterprise. They endeavoured to establish, here and there, lines of torpedoes, and thus to check the movements of the enemy. They succeeded in this manner in sinking two monitors. A third had until now escaped, and by her vigilance had extremely inconvenienced them. She performed wonders of energy and activity, at other times unusual Turkish characteristics, continually harassed the Russian batteries, and sank their boats. At last, the Russians resolved to attack her, and to launch their torpedo-boats with torpedoes for this purpose.

On the 23rd June, in the vicinity of Olti, near Flamound, Major-General Leonoff, who commanded the Russians at this spot, having observed that the Turkish monitor was starting from Nicopolis to go down the river, ordered two torpedo-boats, the "Choutka," commanded by Midshipman Niloff, and the "Mina," commanded by Sub-Lieutenant

Arens, to conceal themselves behind an island, and to observe the passage of the enemy's ship. When she exposed herself on their path, they rushed at her, rigging out their spar torpedoes, these being of the same style which Doubasoff had used at Braila. But their success was very different from his. The Russians perceived rapidly that they had to deal with altogether a different sort of adversary than the monitors which they had previously sunk. With astonishing smartness she prepared for the attack; she let fall nets, and rigged out from her sides, spars furnished with torpedoes, capable of blowing up the first boat which came near her. At the same time she opened a lively fire of case shot and musketry, which would have been most annoying for the assailants, had they not been provided with shields or covers. It is remarkable that she did not fire a single solid shot, despairing probably of striking adversaries so active, and placed so low and near to her. She avoided their approaches, by quick and active movements, suddenly going astern, stopping, going ahead, and puzzling, every moment, her diminutive but dangerous enemies. Sub-Lieutenant Arens, in the "Mina," had attacked first, but one of the torpedo wires was cut by a shot, then the boat herself was damaged, and he was obliged to retire. Niloff, on his part, who was thus left alone, struck against a torpedo-spar projecting from the fore part of the monitor, and drifted aft along the port side, at a distance of about 6 feet, trying to strike her; but, whilst a discharge of case threw a quantity of water into the port side of the "Choutka," the monitor put her helm to port, and thus exposed her stern to the boat's torpedo, Niloff passed across to starboard, but, half full of water, and his boat having lost her way, did not succeed in blowing up his adversary.

There was not much for them to be ashamed of; it was a European, an Englishman, who had conducted such a splendid defence. The Russians recognized, on the bridge, the Captain of the monitor; he was a tall man, with a long, fair beard, standing nearly motionless with his hands in his pockets. This plucky man was not long satisfied with only avoiding the boats; he took the offensive, and, seizing his opportunity, was able to get one of the boats between his ship and the shore, at a very little distance from the bank. The bow of the monitor being pointed broad off from the shore, he went astern, in the hope of crushing the boat, whose bow was towards the shore. At this moment the Russian engineer was wounded, the boat's crew—the boat being thrown on shore by the current—were seized with a panic and jumped on shore; but some of the braver of them got into the water, got the boat afloat again, put the engines on to full speed, and saved her; she only received some slight rubs. One of the Russian Officers who had jumped on shore during the scrimmage, fired, at about 15 yards distance, three shots with his revolver at the Captain, who quietly took one of his hands out of his pocket, raised his cap, bowed, and gravely resumed his position of immobility. He had not been touched.

The fight lasted yet for an hour; at last the brave Englishman was wounded, he had to go below, and his ship returned to Nicopolis without any further pursuit.

His adversary, Niloff, had not been wanting in either audacity or courage, although his enterprize had not succeeded; he had received four or five wounds, according to the official report. He was rewarded with the Cross of St. George, 4th Class, and Arens received the Order of Military Merit.

Subsequently, the monitor was shut in between the lines of torpedoes, and placed out of power of action; she had no longer her old Captain. The English newspapers said that if all the Turkish monitors had been commanded by officers of his stamp, the Russians would not so easily have constructed the bridges of Simnitza and Sistova.

The affair which we have described presents much interest; it illustrates, perhaps for the first time, a ship opposing torpedoes to other torpedoes carried by boats; and also manœuvring to rid herself of her enemies, like a lion defending himself against cats. We must observe that the accounts of this affair which we possess are almost entirely English, but one of the correspondents, that of the "Daily "News," was writing from the Russian side. From that side we have only a very concise report of the Grand Duke Nicholas, and a telegram which he begins with these pompous words:—"The bravery of our "sailors is unimaginable, incredible, and unheard of," and in which he proceeds to allow the failure of the torpedo-boats. From other quarters, the Russians paid their adversary his just tribute of admiration.

2*nd. Night affair of* 23*rd–*24*th August*, 1877.

In August, 1877, the Turks seized upon Soukhoum, a little semi-circular bay, exposed to south winds, and protected by a bastioned fort. The Russians were manœuvring to regain possession of this port; one column of troops, under the orders of Colonel Chelkofnikoff, were following the coast between the river Sotcha and Cape Pitzound, intending to pass through the narrow passes of Hagra, one of which skirts the sea, and the other crosses the mountain some distance in the interior. All this coast is very high, rocky, and thinly populated, and very inaccessible. Here and there the Russians have built forts, Navaginsk, Saint Douka, &c., in places where a ravine watered by a stream renders communications possible.

The "Constantin," Lieutenant Makaroff, received orders from the Commander-in-Chief of the Black Sea fleet, Adjutant-General Arkas, to help Colonel Chelhofnikoff in his march on Soukhoum-Kalé, and especially to take care that he was not taken in flank by the Turkish ironclads, in his passage of the sea-coast pass of Hagra. Leaving Sebastopol on the 16th August, the "Constantin" arrived on the coast of Abkasia on the 18th, and cruized the whole day between Touabse, Cape Sandripeh, and Adler, without being able to obtain reliable information as to the exact position and movements of the Colonel. During the night she sent off her four torpedo-boats, the "Tchesmé," "Sinope," "Navarino," and "Torpedoist," to continue the search, to visit the coast as far as Hagra, to assure themselves of there being no ironclads there, or to sink them if they could. The boats, after a useless course of five or six miles along the coast, were

hoisted up again on board the "Constantin" about four in the morning. Makaroff found himself at daylight off Hagra, where he heard a lively fire being kept up; suddenly he observed an ironclad, which, covered by the land, had been invisible to him, coming towards him, whilst his own ship, standing out against the sky, had been immediately noticed by his enemy. The "Constantin" drew the enemy off the shore, bring able to steam 12 knots, a speed which the Turk could not approach; however, after a couple of hours, a squall of wind and rain separated the combatants. Nevertheless, the intervention of the "Constantin," in drawing the ironclad off the shore, the former, in spite of all her efforts, being still ignorant of the movements of the shore column, had the effect of freeing a Russian column, which the fire of the ironclad had placed in jeopardy, and allowed it to take up a more favourable position. Thus it is that during war, movements apparently futile, performed in execution of orders, produce results which those who perform them never suspect, and which should encourage the patient accomplishment of every duty, even though its object may be obscure. On the evening of the 19th, the "Constantin" found herself again on the coast, at Sotcha and Adler. During the night the torpedo-boats were again sent away, and in spite of a heavy swell and rain, and a heavy storm which raged, they reconnoitred the shore as far as Hagra, and assured themselves that the Russian column had not been able to drive the Turks out of it.

Makaroff now returned towards Novorossisk. There, remembering that a lunar eclipse took place on the 23rd, he resolved, in consultation with the captains of the torpedo-boats, and with General Arkas, who was consulted by telegraph, to take advantage of this phenomenon, to attempt an attack on the Turkish ironclads, anchored in the creeks or bays of the coast. General Oklobjio had previously informed him that some were always anchored in Soukhoum Kalé, and also promised to send, on the morning after the eclipse, detachments along the shore to look after the torpedo-boats and to render them assistance in case they should be obliged to separate from the "Constantin."

The latter quitted Novorossisk on the evening of the 22nd August, arrived at Sotcha on the following morning to obtain information, then stood 35 miles out to sea, where she met a quantity of Turkish small craft laden with Abkasian refugees; returned in shore at sunset, and at ten o'clock was 6 miles from Soukhoum Kalé.

Makaroff now got ready his four boats.

1st. The "Sinope," Lieutenant Pisarefski, with a midshipman, a pilot, and five petty officers or seamen.

2nd. The "Torpedoist," Midshipman Nelson Hirst, aided by Lieutenant Koroleff, Officer torpedoist, with five petty officers or seamen.

3rd. The "Navarino," Lieutenant Vichnevetski, with five petty officers or men.

4th. The "Tchesmé," Lieutenant Zatzarennyi, a pilot, an engineer, and four men.

Zatzarennyi, Officer torpedoist, whose courage was never shaken by several expeditions of the same sort, though generally unsuccessful,

received the command of this one. His mission was to destroy the pile stockade which they *wrongly* supposed to exist round the ironclads, and to blow up two of them.

The boats, each towing a "wing" torpedo, left at half-past ten in fighting order, in two lines, the "Tchesmé" followed by the "Tor-"pedoist," and the "Sinope" by the "Navarino." Each pair of boats was, rendering mutual aid, to attack an ironclad. The full moon was still in all its brightness, and certain brightly lighted buildings at Soukhoum indicated their way to the Russians. At 10.45 the expedition met a little sailing boat, avoided her and did not continue their advance until she had disappeared under the shore, at 11.30 they were three or four miles from the town and stopped to wait for the final darkness of the eclipse. The eclipse began about 11.45, and when, two hours later, the moon had a third or a half of its face hidden, Zatzarennyi went on ahead, steering towards Kelasour, a village situated about $2\frac{1}{2}$ miles south-east of Soukhoum, in order to observe better, as he left there, the vessels anchored in the roads. At 2.45, the eclipse being nearly total, the boats, as they followed the coast, arrived near enough to the town and to the roadstead to discover a quantity of feluccas secured to the shore, and to the left of them, two ships, towards which they steered, which were moored with their heads in shore about two cables from the shore, in six or seven fathoms' water. Instead of the darkened moon, the scene of action was lit up by the hospital establishment, and by an immense pile of wood which was blazing on the beach. Round this fire they could see moving human forms, a drum was beating, and quite close a battery of guns was stretching away into the darkness. It was a scene that might have been painted by Rembrandt.

One of the two ships was an ironclad, the "Assai-Chefket," brig-rigged; she was the nearest to the Russian boats, and showed her starboard side towards them; the other was a merchant ship. The "Sinope" and "Navarino" advanced towards the ironclad with their "wing" torpedoes rigged out. Hailed by two "*Qui vives*"? to which they did not reply, the Russians steered for the midship part of the "Assai-Chefket," and nearly reached it, in spite of the fire from the ironclad, with which the shore battery joined in; but they had not noticed a Turkish boat which was manning at the foot of the accommodation ladder. Hence the "Sinope" and "Navarino," in firing their two torpedoes with those "Hurrahs" so dear to the Slavs, only reached the woodwork of the ironclad, without seriously damaging the hull. Makaroff says in his report that the explosions were very satisfactory. He states that they must have reached the coal bunkers, as the sea was covered with black water. In view of the subsequent condition of the "Assai-Chefket," we are obliged to conclude that the water was only blackened by the incomplete combustion of the powder or gun-cotton, an appearance which follows all explosions.

The "Sinope's" torpedo blew the ladder to pieces, but did not harm the Turkish boat. The boat's crew arming themselves with oars and stretchers, engaged in a hand-to-hand fight with their enemy, and

one of them, with a blow with the boathook, hooked on to Lieutenant Pisarefski's overcoat, pulled him over the gunwale of the Russian boat, and with his body half in the water, being already wounded, this Officer was nearly done for, when the revolver shots of the coxswain Zemliakoff, and the carbine of the volunteer Bailikoff saved him, by letting his men pull him out of the water. All this was the affair of a moment.

According to the Russian account, the explosion of the "Navarino's" torpedo destroyed the Turkish boat and heeled over the ironclad; as far as concerning the boat, this may be true; as to the ship, she was simply slightly rolling to port. Anyhow the "Navarino," which, according to Zatzarennyi's account was 13 or 16 yards from the explosion, was half filled with water, and she, as well as the "Sinope," ceased to figure in the attack.

Was there any panic on board the Turk? Some men, surprised and frightened, threw themselves into the sea over the bulwarks with "heart-breaking cries," the Russians say; but Ismail Bey, who commanded the "Assai-Chefket," had not served for some years previously in the English Navy for nothing. He made half his men lie down on the deck with their rifles, the guns were cast loose and loaded, and mitrailleuses were in position at the extremities of the upper deck, on the poop, and topgallant forecastle. The approach of the Russian boats had been signalled by the Turkish guard-boats, thanks to the bonfire on the beach, which was put out during the engagement.

We do not wish here to detract from the merit of the Russian Officers, or to throw any shade on their valour, but we want to establish how much the employment of torpedoes, whether spar or towing, is destructive against an adversary on his guard.

Zatzarennyi, however, had quickly made out that the second vessel moored near the "Assai-Chefket" was only a little merchant brig, and turning back towards the ironclad, he ordered the "Torpedoist" to renew the attack. A third "wing" torpedo was towed under the "Assai-Chefket," exploded on her starboard side, and caused her to roll briskly; yet again cries of terror were heard, and men throwing themselves overboard. Zatzarennyi, who until now had held himself in reserve ahead of the ironclad, between her and the shore, was in doubt whether these cries and the noise did not come from his own friends, and advanced in his turn to help them, and to finish their work. His torpedo arranged, he passed along the starboard side of the monitor and found himself in the middle of a quantity of wreckage, broken water, and men swimming. At this moment the "Assai-Chefket," in rolling, fouled the "Tchesmé," and put her gunwale sufficiently under water to cause her to half fill with water. Everything fetched way on board the "Tchesmé," battery, boat's crew, and all; the torpedo fouled the *débris* of the accommodation ladder, and they were obliged to cut it adrift, the Turks finding it on the shore the next day. The Russians, bruised and blinded, got clear of the side of the ship as best they could. The rifle-fire first stopped; the guns of the "Assai-"Chefket" continued, being fired haphazard, their shot passing over the heads of the Russians, who replied with rifle-shots; then the Turkish

ship ceased fire altogether, and the battery alone which was near the bonfire continued a dropping fire.

The Russian torpedo-boats hauled off quickly for the rendezvous, but the "Torpedoist," not turning up immediately, Zatzarennyi went back to look for her on the scene of action, and in the darkness he could only see the masts of the ironclad; he also still heard, he says, "cries " and groans, from all which I concluded that the ironclad was already " sinking; as to attacking her again, I could not: my battery was " smashed up."

Not wishing, then, to remain any longer under the enemy's fire, he returned towards Kelasour, and half an hour later he picked up the "Torpedoist." At half-past four the four boats rejoined the "Constantin" at the same place as they had left her.

The day was breaking, and at this moment the navigating Officer fancied that he saw in the mist, masts on the starboard hand. The crew of the "Constantin" set to work, and in seven minutes the four boats were hoisted and the "Constantin" was under full steam. During this time the masts, smoke, and hull of the suspicious ship were passing towards the other side. It turned out to be an ironclad of the "Osmanié" type, which happened to be only three miles off.

As usual, the Russians allowed to no killed and wounded, with the exception of Lieutenant Pisarefski.

Zatzarennyi made a great mistake when he imagined that the "Assai-Chefket" was sinking. He made Makaroff and General Arkas, in whose opinions the ironclad *ought* to have sunk, share in it. In point of fact, she only received trifling damages, and the correspondents of the *Times* and *Standard* boasted of this, and exaggerated the failure of the Russians in saying that three Russian torpedo-boats had been sunk, and the fourth only escaping by flight. According to the account of the Captain of the "Assai-Chefket," one torpedo only could have exploded, but not in contact, and its premature explosion rendered it harmless. We think that this was the case with all three. The Turkish Captain attributes the failure of the attack to the brisk rifle-fire with which he received the boats. On the 31st August the "Assai-Chefket" was at Constantinople. On the 12th September she received orders to cross the Adriatic to the entrance of the Gulf of Arta.

The "Constantin," on her part, returned to Yalta on the 26th August. One cannot refuse to recognise the activity and bravery which Makaroff displayed in this six days' cruize, and of which he had already given proof at Batoum and Sulina.

3rd Bombardment of Sulina, 9th–10th October.

The attack of Sulina was an expedition which had been prepared by the Russians with great care, and the Navy played such an important part in it that we shall ask the reader's leave to exceed for a moment our subject, and to relate the whole affair, especially as we shall observe the action of torpedoes at every step, notably so in the most important incident of the fight.

The Danube empties itself into the Black Sea by three mouths, the

Kilia and St. George, both of which subdivide into a crowd of small channels, and the Sulina, which, on the other hand, has but one. Although this latter only conveys to the sea about the twentieth part of the water of the river, it is the most important, since, in consequence of the International Commission works, the depth there reaches 18 feet, whilst it does not exceed 6 to 10 feet in the other estuaries. In the neighbourhood of Toultcha the river divides into three branches, and its delta forms two large islands: Letti, between the Kilia and Sulina mouths, and Moüh, between the Sulina and St. George mouths. They are extremely swampy, and strictly speaking are nothing but marshes, from which sprout here and there clumps of rushes, whose roots are in the water.

The town of Sulina stretches along the right bank of the river for about a mile from the entrance. Hence it is built on Moüh island, the absence of rushes, which flourish to the westward of the town, leaving to the south-east a large bare plain. In the east part of the town, as well as on the left bank of the river, the International Commission has built warehouses, shops, and stone houses. The rest of the buildings are nearly entirely of wood and of miserable appearance. In going up the river, the average breadth of which is about 220 yards, between the reeds which fringe it right along, are seen the posts and marks indicating the miles from the entrance.

Sulina is accessible from five points:—

1st. From coming down the river.

2nd. From the sea.

3rd. By the sea coast of Letti, round which there is from a village of the same name a strip of firm land, although covered with reeds, about 45 yards broad, within which, however, the soil is impassable.

4th. From the south; on the Moüh Island from Kedriles, a village on the St. George mouth, there is a strip of land analogous to that on Letti; but it is exposed, and consequently easy to defend.

5th. By a canal, narrow and shallow, amongst the rushes which leaves Ivanitza on the St. George mouth, and comes to an end at the back of the town.

At the time of the Russian attack Sulina was protected by three batteries, one on the north shore, situated at 1,600 yards from the watch fire placed at the extremity of the breakwater; a second opposite the first, on the south shore; and a third on the same side as the first, but much further up the river. Abreast of this last, that is a mile and a quarter from the mouth, there were stretched, with an interval between them, two large chains, secured solidly across the river, and a third closed the entrance from the sea. The ironclad "Moukhadem Khair," which could steam 14 knots, defended the first stockade; the other, being under the protection of the ironclads "Medjemi," "Chefket," and the "Mouiné-Zafre," the latter bearing the flag of Mustafa Pacha. Finally, about the middle of September, they had laid down near these obstacles electro-mechanical mines similar to those on the Bosphorus, but which had to be placed on the bottom in consequence of the slight depth of the river. They had even buried some in the banks, and in the neighbourhood of the batteries, and covered them with stones to

act as mitraille. These mines were cylindrical, made of boiler iron, the thickness of the sides being ·37 inch, that of the ends ·6 inch, their length being 5 feet, and diameter 3 feet 3 inches. Three quarters of the interior, about a cubic yard and a quarter, were filled with pebble powder.

Besides the ships already mentioned, the harbour contained the "Kartall" tug, which only drew 3 feet water, and was armed with five small guns, two Armstrong breech-loaders and one Krupp, and two copper guns; the ironclad "Kifzi-Rakhmann," with one 9-inch gun on the forecastle; the "Sulina," an old gunboat, but well armed, carrying five guns, one 20-pounder Krupp placed on the top-gallant forecastle, and four bronze guns, two rifled and two smooth bore, about 30-pounders.

The Turkish garrison consisted of three battalions of infantry and 100 Tcherkesses.

Such, at the beginning of October, was the state of Sulina when the Russians tried to force it.

Resolved upon since July, the expedition was entrusted to Lieutenant-General Verefkine. On the 9th August, a squadron which had assembled at Odessa, arrived at Vilhové on the Kilia mouth, and established itself near the shore before the village of Piriprav, at the end of the Tcherniava arm. One battalion of the 143rd Regiment of Dorogoboujki established itself opposite at Bazartchouk; the two other battalions of the same regiment, the third battery of the 36th Brigade of Artillery, and a sotnia (100 men) of Cossacks occupied the village of Letti, and proceeded to reconnoitre the town. The strip of land along the coast, which the Turkish ships could flank, was considered too exposed for the advance of a column, and everywhere else it was impossible to cross the swamps of the island except with water breast high. Causing then the island Moüh on the right bank of the Sulina mouth to be explored, General Verefkine perceived difficulties of the same class, and resolved only to occupy the villages of Iovantchi, Kedriless, Karadjan, and Karaozman. Finally, he satisfied himself that right along the Sulina arm itself there was no other road, and that beyond the fourth mile-post the bank of the river itself was impracticable owing to the reeds and swamps. Hence, not being master of the sea, General Verefkine was convinced that the only way of getting at Sulina was to use the channel itself, and that the principal attack must be entrusted to the Navy, and that the troops must aid by a diversion. It was decided that the expedition entering the Danube by the Kilia mouth should ascend the stream to the head of the delta, and come down again by the Sulina arm to attack the town.

New ships, and their equipment, were hurried on by the ports of Odessa and Nicolaieff, and on the 5th October the flotilla, under the command of Commander Dikoff, was at last ready for action.

Its composition and armament was:—

1st. Screw gunboat "Voronn," three 6·2-inch mortars and two 9-pounders.

2nd. Screw gunboat "Outka," three 6·2-inch mortars and two 4-pounders.

3rd. Screw gunboat "Lebedi," three 6·2-inch mortars, one 3-pounder, and two 4-pounders.

4th. A wooden barge, carrying two 6·2-inch mortars, and a 9-pounder.

5th and 6th. Two steam tugs, "Opyt" and "Sestritza," each with two 4-pounders and a howitzer.

These six ships were commanded by Commanders.

Finally, seven torpedo-boats, of which one, fitted out by the Odessa Yacht Club, bore the name of "Lieutenant Poustchine," and were commanded by five Lieutenants, a Sub-Lieutenant, and a Midshipman. Besides these a hired wooden barge served for a pontoon, and another for a powder and shell magazine.

The flotilla, in which the Moldavian flag was joined to the Russian, had received 90 torpedoes and 75 gun-cotton rockets, for which the boats could carry two travelling troughs and two boats' tubes.

On the morning of the 5th October, under the orders of General Verefkine, the flotilla weighed from Vilkové, embarked at Bazartchouk three companies of Dorogoboujki's regiment, ascended the river as far as Toultcha, which is at the head of the Danube delta, and thence descended back again, down the "Sulina" arm. It landed a company at the sixteenth mile-post to occupy on the right bank the village of Karaozman, then stationed itself in front of a line of torpedoes which had been previously established by the Russians near the twelfth mile-post.

This operation, which ought to have been completed on the 6th, was delayed by the badness of the weather, the slowness of the ships, and was only finished on the evening of the 8th; it cost the Russians the loss of the torpedo-boat "Lieutenant Poustchine," which, on the 7th, when going full speed, touched and sunk. It was decidedly an unlucky name.

Whilst this delay was occurring, General Salatzki, who commanded the troops on the Letti Island, and who was counting on an earlier arrival of the squadron, had sent off, on the evening of the 7th, by a footpath tracked beforehand through the reeds, and near that by the border of the sea, a detachment of blue jackets and a rocket party, commanded by Midshipman Drijenko, which he caused to be supported by a column in his rear. The detachment, after inexpressible fatigues, was able to arrive near the Turkish outposts, but made no attempt to attack, owing to the non-arrival of the ships. Discovered on the afternoon of the 8th, they were driven out by the Turks, experienced heavy loss, and only saved themselves with great difficulty. The commander of the flotilla, Dikoff, having arrived at the twelfth mile-post, wished, before going further, to lay down near Sulina itself a new line of electro-contact torpedoes, which should close the river to the Turks and permit the Russian ships to approach the town in safety. The senior Lieutenant, Krouskopff, who commanded boat No. 8, was charged with the execution of this duty, with five boats, whilst Sub-Lieutenant Strogonoff, with the boat "Vikhio," of which he was the owner, was sent as guard boat.

This little expedition started at six in the evening; Krouskopff's boat towed two launches, carrying 30 chasseurs of Dorogoboujki's

regiment, intended to dislodge the Turkish outposts, should they be found troublesome, near the second mile-post. The other boats each towed a "loftcha," a little native boat, carrying two mines. At the same time, Verefkine sent along the right bank of the river 60 chasseurs, to help on this side the operations of the torpedo party at the second mile, but the difficulties of the country prevented their passing the fifth mile.

After having placed his mines, Krouskopff was to await the fleet between the third and fourth mile, to point out their anchorage to them; it was supposed, in fact, that the work would be finished by one in the morning, and that the flotilla would be able to post themselves by daybreak in their stations for action.

But they had not reckoned on the intense darkness of the night; the boats, firstly, lost much time in looking for a good place to land the troops. Then, passing the second mile mark, they got too close to the outer chain placed by the enemy, and were observed by the Turks; hauling off with difficulty, for they then had to tow their "loftchas" up stream, they at last succeeded in anchoring in the bend of the river nearest Sulina, and laid down their mines, but they were much disturbed by fire of case and musketry. Although this was the first occasion that this Russian force had been under fire, the torpedoes were anchored with care; unfortunately the boat which Midshipman Radetzki was towing carried away its painter, and the "loftcha," its two mines and a seaman were swept away by the current and thrown on shore, about three-quarters of a mile from the outer Turkish stockade. The Russians evidently dared not try to rescue them, and they fell into the hands of the enemy, except the man, who jumped overboard, reached the reeds, and was picked up by the chasseurs. Another "loftcha" also carried away its tow, but being daybreak, the Russians were able to save it, the Turks, as usual, being too slow.

At 6 A.M. on the 9th October, Dikoff was informed that the mines were placed successfully. Embarked in the "Voronn," he immediately descended the river to take up his station for action, which operation he had intended to perform during the night. On arriving at the sixth mile, he sent the "Opyt" on ahead, she being provided with an arrangement for picking up mines. Seeing this, the Turkish ironclad "Khifzi-Rakhmann" made the signal for action, and the "Kartall" stood towards the Russians. Thanks to her small draught of water, she crossed unharmed, the line of the enemy's mines opened a murderous fire of case on the chasseurs and the boats amongst the reeds, and even sent boats after them, which were, according to the Russian accounts, compelled to retreat precipitately. Then, seeing all the Russian divisions within three miles of her, she called the "Sulina" to her aid. On his side, Dikoff, seeing the dangerous predicament of the chasseurs, entrapped between the river and the marshes, recalled the "Opyt," and advanced himself with the "Voronn," followed by the "Outka" and the "Lebedi." The action was thus becoming lively.

It was the first day of the feast of Bairam. All the Turkish ships

were dressed with masthead flags. Whilst the "Kartall" steamed up the river along the south shore, the "Sulina," which had got under weigh at 7.45, followed the north shore, and fired on the Russians. Suddenly, at 8.10, as she was passing the little bend in the river, she struck with her starboard bow one of the Russia line of torpedoes; a column of water was raised, and, in a few minutes, she was at the bottom, her four flags indicating from afar the scene of the disaster. She sunk across the river, her bow being 30 yards from the north shore, with water over her deck nearly to the bridge; the foremast, though carried away, had not fallen, but the maintop-mast had come down. The guns forward, and the Krupp on the forecastle, were thrown out of their carriages into the water, and a boiler blew up a few moments after the explosion. As to her crew, the Second Lieutenant of the "Sulina," who was on the forecastle, was killed; the Second Lieutenant of the "Moukhadem-Khair," who was on the bridge with the Captain of the "Sulina," was thrown down the hatchway and wounded so badly that he died the next day; five men were badly burnt or wounded, six were missing, and the rest of the crew saved themselves by swimming and were picked up by the "Kartall," who came to the rescue of the "Sulina." The Turkish Captain abandoned the masthead flags, in order, as he said, to obtain help sooner for the Second Lieutenant of the "Moukhadem-Khair."

The "Kartall" immediately returned to Sulina with the remains of the crew of the "Sulina," and the "Khifzi-Rakhmann," who was following the latter ship, stood on. Suddenly, instead of closing with the enemy, as had been her intention, she stopped inside the line of the enemy's torpedoes. The Russian flotilla took station about 8.30 A.M., between the third and fourth miles, and at the enormous distance of 6,000 yards a cannonade was commenced between them and the ironclad "Khifzi-Rakhmann," which the shore battery assisted in, and which the "Moukhadem-Khair" was not long in taking up. But the shot from this latter fell 500 or 600 yards short of the nearest Russian, because her ports and carriages would only allow of an elevation for 4,000 yards range. The shells from the bow gun of the "Khifzi-Rakhmann," on the contrary, burst nearer and nearer to the enemy's ships, and one of them, having only just failed to reach the "Voronn," Dikoff hauled off a little, as his own shell were often passing their mark.

At 1 P.M. a thick fog got up, and the Russian flotilla, ceasing action, withdrew to the fifth mile.

At 1.50 P.M. a Russian column, coming from Letti, appeared. With great trouble they had managed to get up, avoiding the path by the beach. They established a rocket battery 1,600 yards from the Turkish battery on the north shore. To this tardy attack, which had been intended to divert attention from the main river attack, the Turks replied by sending a column of marines, and the "Mouini-"Zafie," which, steaming up the shore, took the Russians in flank. The latter contented themselves with firing nine rockets, of which one fell on the right bank, in front of a house belonging to the International Commission, and then retired, having had two men wounded.

From the same side, on the Letti Island, the Russians made two reconnaissances during the night, and on the morning of the 10th, the first being by Cossacks and the second by two companies dragging two field-pieces. This latter, timidly sent off at 6 A.M., was repulsed by the combined fires of the shore battery on the left bank and of the ironclads "Mouini-Zafie" and "Medjemi-Chefhet." The 9th closed quietly on the river. The Turks had only had one man touched by the fire of the enemy, but the blowing up of the "Sulina" had cost them a heavy loss. During the night the "Khifzi-Rakhmann" and the "Moukhadem-Khair" shifted berth a little down the river, for fear of a night attack. The night was exceedingly dark until daybreak, and a beating rain never ceased falling, driven by a fresh breeze. There was nothing to fear either from seaward or from the river.

As a whole, the affair of the 9th, in spite of the blowing up of the "Sulina," was a failure for the Russians. They hoped to carry Sulina by a smart attack, and they had not succeeded; and in the evening Verefkine received telegraphic orders to cease the attack on Sulina, and to content himself with engaging the ironclads. For the greater safety of the fleet, he had placed, during the night, a fresh line of electro-mechanical torpedoes higher up than the previous one. This was carried out successfully, without the men being seen or disturbed by the enemy. The defence of this line was entrusted to a detachment of infantry situated in the marshes, and supported by steam launches.

The morning of the 10th October, the weather had cleared up, Dikoff advanced his flotilla to their stations of the day before, by the fifth mile mark; in rear, by the eighth mile, was the barge used as powder magazine, to which the steam launches went to and fro.

When the Russians perceived that the ironclads had dropped back, they let themselves drift a little, and opened fire about 7.30 A.M., at 5,800 yards, on the "Moukhadem-Khair" and the "Khifzi-Rakh-"mann." At 9.30 the latter was struck in the boilers, and obliged to retire to the roadstead near to the "Mouini-Zafie." The shot was fired from the "Voronn," and had been fired in the presence of General Verefkine, who congratulated the gunners, and gave the captains of the guns a pecuniary reward.

Still drifting down, the flotilla was able to advance as far as its own second line of torpedoes, in order to engage more effectually the "Moukhadem-Khair," which remained henceforth alone, and was making very bad shooting, all her shot going to the right. Finally, this ironclad, which the "Mouini-Zafie" came for a moment to support, retired behind the cross jetty, a mole of the port of Sulina, built of the ballast from ships, and there, if she ceased her own fire, was completely sheltered from the fire of the enemy. Two steamers and the floating battery came down and anchored about the third mile, but they were still 4,800 yards from the "Moukhadem-Khair," thus the fire from their 6·2 inch guns was uncertain. However, many of their projectiles burst under the bows of the ironclad, and one wounded a sailor on the forecastle. But this was all. Elsewhere, the town received 30 out of the 200 shots fired by the enemy, and suffered con-

siderably. The buildings of the International Commission, built near the shore, and beyond the range of the Russian pieces were, however, not touched.

After her retreat, the "Moukhadem-Khair" fired a few rounds during the afternoon; the battery on the right bank ceased fire, their guns, like those of the ironclad, not having sufficient range.

The Turks suffered very slightly, one gunner was wounded in consequence of a miss-fire. The next day they found, in the outskirts of the town, a lot of shells, whose fuses had not acted, or with not sufficient effect to ignite the bursting charge.

As to the Russians, who had a fair field, they dared not approach the Turkish obstacles to destroy them. Satisfied with having silenced the enemy's fire, they ceased firing at 4 P.M., and withdrew to the fifth mile.

The night of the 10th was as windy and rainy as the preceding one. On the 11th, at 7 A.M., the fusilade recommenced from the left bank; during the night the Russians had concentrated on this site at two miles from the town, three companies of infantry and a rocket detachment, and fired, at 2,000 yards, several rounds from their field pieces. The Turks did not reply to this. The Russians subsequently declared themselves very dissatisfied with their gun-cotton shell rockets. They were very unsteady, and one, bursting near the trough, wounded several men and broke a rifle. This sort was not employed on the river.

This demonstration was the last. All the day of the 11th and the succeeding night was fearful weather; the Russians never dreamt of repeating the attack. The Czar sent them his "thanks," and, at the same time, the Minister for War wrote, recommending them to be careful and to spare the building of the International Commission. Verefkine read this as directing him to cease all offensive operations, as it was impossible to get at the ironclads without damaging the town. Satisfied with the results attained, meagre as they were, he ordered Dikoff to withdraw the flotilla.

The Russians allow to two killed and three wounded in their operations on the river.

During the night, Dikoff had a torpedo placed under the sunken ship, the explosion of which destroyed her completely; the Turks fired a few shots. The operation had been entrusted to Lieutenants Fridrick and Skriaguine and Sub-Lieutenant Stragonoff, who carried off the flags from the mastheads.

On the evening of the 11th they left for Nicolaïeff; although Dikoff subsequently received the Cross of St. George (4th Class), and Kionkoff, Fridrick, &c., that of Vladimir, it is curious that they were all relieved of their commands after the affairs of the 9th and 10th October.

To have been successful, the Russian attack on Sulina should have been conducted in a much more vigorous manner; the adversaries remained separated by two stockades and two lines of torpedoes, which ought to have been forced if they wished to arrive at any result, which not being done, was impossible to obtain.

Dikoff understood this thoroughly. "According to my ideas," says he, "it was only possible to get rid of the Turkish squadron by attacking them with torpedo-boats, prepared beforehand for decisive action. "But before sending these out, it was necessary to silence the battery "on the right bank, armed with eight smooth-bores, whose fire was "more dangerous than that of the heavier guns of the four ironclads. "Without extraordinary luck, our bombardment could not effect this, "since our ships were stationed close to a line of torpedoes, placed on "the night of the 9th October, beyond which it was impossible to "engage the ironclads moored near the moles of Sulina $1\frac{1}{2}$ miles "from the west of the town, and $2\frac{3}{4}$ miles from the positions of our "ships. To have continued the bombardment it was necessary to "destroy our line of torpedoes, sweep for the Turkish torpedoes placed "near the river obstacles, destroy these obstructions, and pass with our "flotilla into the port of Sulina itself, where it would have been possible to destroy the second fort on the right bank, and engage the "ironclads. It is true that between them and us there should not have "been the obstacles which protected us, and the Turkish Admiral "should not have permitted us to fire with impunity on his ships."

We have seen that the Turks had seized two torpedoes carried off by the current with the raft which carried them. A description of these torpedoes has been given in the *Army and Navy Gazette*.[1]

4th. Night affair of 27th and 28th December, 1877.

In describing this affair in our previous number, we wrongly imagined that the "wing torpedoes," which the boats were preparing to use when rejoining the "Constantin," were an early pattern of Whitehead. They were simply towing torpedoes of the same class as were used by Zatzarennyi at Batoum, Sulina, and Soukhoum.

Here are some further details to our previous account of the Batoum affair.

The "Tchesmé" carried her discharging tube under her keel and cast it adrift when steaming for the "Constantin," the "Sinope" carried hers on a raft.

The "Tchesmé's" Whitehead exploded between the fore and main masts, and the column of water did not reach half way up the side of the ship. There was, therefore, little effect. We suppose that it never touched the ship, but a rock on the bank near which she was moored.

As to that of the "Sinope," we believe, from General Arkas's first telegram, that it never exploded at all.

Night affair of 25th and 26th January, 1878.

On the 22nd January, 1878, the Commander-in-Chief of the fleet and harbours of the Black Sea ordered by telegram Makaroff in the "Constantin" (now become Captain) to cruize along the east coast of the Black Sea, and to make a demonstration against Batoum.

[1] It will be of interest to naval Officers to know that the defence of Sulina was planned, and the forts built, and torpedoes laid down, by two late English naval Officers, Captain Manthorpe and Lieutenant Sleeman.—(Translator.)

On the same evening Makaroff sailed from Sebastopol, carrying under his davits two torpedo-boats, armed with Whitehead torpedoes, and experiencing during the night a strong breeze from south-west, which veered to north-east in the morning and blew very hard.

The "Constantin" rolled so heavily that her boats dipped in the water; but, however, thanks to the care with which they were secured, they sustained no damage, and on the evening of the 24th the steamer arrived at Soukhoum. Although the wind had gone down, a heavy swell remained, and did not permit them for some time to approach the enemy's coasts.

The 25th January, in the evening, the swell had gone down considerably, and the "Constantin" steered for Poti, where Makaroff learnt that the whole Turkish fleet was at Batoum. He resolved to attack them immediately, started off, and when four or five miles from the place started off his two Whitehead torpedo-boats, the "Tchesmé," commanded by our old friend Zatzarennyi, and the "Sinope," under the orders of Lieutenant Stetreckenski, who had already taken part in the affair of the 26th December.

The command of the expedition was, as usual, given to Zatzarennyi.

The boats left the ship at 11.20, and steered in the direction indicated by Makaroff; but a slight fog and the snow which covered the mountains, altering the appearance of the coast, Zatzarennyi went backwards and forwards, and it was not until 1.30 that he entered the roads of Batoum from the north. The moon was rising behind the hills, and about two o'clock she shone brightly on the squadron, and on the enemy's port. The picture was striking, the reflection of the moon's rays from the snow on the mountains gave everything a singular brilliancy. At the entrance of the bay was a guard-ship, which was lying broadside on to the right of the lighthouse; then they could see the white buildings of the town, lighted up by the moon, the battery on the point on which the lighthouse stands, and seven ships, moored stern to shore, as is usual at Batoum. There was a two-masted steamer, with white paddles, two three-masted ironclads, a steamer with large paddle-boxes, and a little further towards the foot of the bay three large ships whose masts could not be clearly seen. The Russian expedition was then one mile from the squadron and half a mile from the guard-ship.

Approaching the latter, Zatzarennyi made her out to be a man-of-war of 1,200 or 1,300 tons, with a bowsprit prolonged to a point beyond the jib, with yards on her foremast, and six boats hoisted up to her davits.

Going very gently the boats approached to from 70 to 90 yards from the ship, and at this distance Zatzarennyi fired his Whitehead at the starboard side at the mainmast. At the same instant Stetreckenski let go his a little more to the right. On the explosion, the two torpedoes threw up a mass of black water as high as half way up the masts. They heard a fearful smashing, and the hull of the ship, *at the end of a minute*, disappeared entirely beneath the water; the next minute the masts had disappeared, a circle of wreckage, pretty regularly shaped, alone marked the scene of the catastrophe. It is unneces-

sary to add that the Russians, by their hurrahs, apprised the enemy that their guard-ship was sunk.

The bay, a moment before so tranquil, was reverberating with the cries of the Turks, who were swimming about, or holding on to floating objects. Zatzarennyi says that he wanted to go and help these unfortunates, but that the boat's screw getting foul every moment of the débris, he hastened to regain a less dangerous situation, and he turned his head to the "Constantin." Smoke was shortly seen from a steamer, or some boats going to the assistance of the men in the water; then a battery on shore fired some shots. Ten or fifteen minutes afterwards they saw signal lights on the scene of the disaster; one ship stood out to sea. At 2.45 the Turks lit up again the light at Batoum. During all this the boats arrived alongside the "Constantin" at 3.15, and were hoisted up immediately. Having thus fulfilled his instructions, Makaroff appeared on the morning of the 27th off Samsoun, and, standing along the coast, returned to Novorossisk and anchored at Sebastopol on the night of the 28th January. After this last expedition Makaroff was made Aide-de-Camp to the Czar, Zatzarennyi a Commander, and Stetreckenski decorated with the Cross of St. George (4th class).

We will not prolong this account and repeat the orders of the day of the General Admiral, the Grand Duke Constantine, or the Commander-in-Chief of the Black Sea fleet; but it would be difficult to find more pompous dithyrambics than the hymns of praise addressed to all the Officers of the "Constantin." On our part, we recognise willingly that they showed themselves to be brave and intelligent men. Anyway, if the attempt of the 26th December totally failed, that of the 26th January succeeded. That appears to be beyond question.

The nine occasions which we have described constitute the most important affairs in which, during this war, the torpedoes played a part.

Nearly all species of these weapons have been tried. Spar and Whitehead torpedoes have shown their offensive value, electro-mechanical mines their defensive value; but in face of the numerous failures of the Russians it will be perceived that a ship at anchor, with a good look-out, has a great chance of escape even from opponents as resolute as Zatzarennyi has showed himself. The Whitehead has introduced, it is true, a new element into the question; it will be necessary, as in the new army tactics, to have alert outposts, active picquets which will arrest any surprise from enemies operating at a distance.

As to the correct defence of ships against torpedo-boats the solution is difficult; but the chief complication of the problem is, that in time of war a man-of-war should be ready to get under weigh at any moment. We think that the question does not admit of a general solution; each particular case must be decided separately. Nets appears to us to be as useless as cumbrous, and we think that the protection ought to be independent of the ship. This would not refer to counter-attacks by torpedoes to assailants which can be seen approaching.

MILITARY RAILWAY-TRANSPORT IN FRANCE.

By Lieutenant-Colonel Clifford Parsons, Professor of Military Administration, Staff College.

It is unnecessary in these day sto dwell upon the necessity for framing, during peace time, an organization and regulations by means of which a State may at once be enabled to reap the maximum amount of advantage derivable from the use of its railways, on the outbreak and during the continuance of war. These advantages have of late years been fully discussed by many able writers, and it may be assumed that the student of military subjects is well acquainted with them. Nevertheless, as an introduction to the subject of this paper, it may be as well to recapitulate them under a few general heads.

First, there is the mobilization of the troops—a period during which small bodies, and even individual soldiers, are travelling independently towards their appointed stations over every railway in the country, when little or no interference with the ordinary traffic arrangements is necessary. Next, there is the transport of the mobilized army corps towards the points selected for the concentration of the forces, during which period certain of the railways involved must be entirely devoted to military uses, all other traffic being either completely suspended or allowed only under the strictest limitation for meeting obvious necessities. When the concentration is completed, the lines leading to the theatre of war are used for conveying to the army its needful supplies both of food and war material, as well as reinforcements of men and horses to meet the waste of warfare; and for removing from the army all its incumbrances, its sick and wounded, prisoners of war, superfluous or unserviceable war material, trophies taken from the enemy, &c.

In addition to the uses already mentioned, there are others to which railways are applied incidentally as circumstances dictate during the progress of the operations, such as the transfer of troops from one scene of operation to another, and the rapid transmission of reinforcements to critical points even during the progress of a battle.

Thus, when large operations are undertaken, there is a continuous stream of military traffic absorbing the greater part of, if not all, the working capacity of these lines, and necessitating an exclusively military control over at least a large section of each line connecting the base with the theatre of war.

Experience has shown that the broad principles upon which this control is best exercised are, first, the division of the management of a railway into two parts—by appointing a transition station, between which

and the terminal stations near the army in the field, military authority shall be paramount during the whole of the operations, the other part of the line, namely, that on the homeward side of the transition station, remaining under the control of its ordinary directors assisted by a military staff with reference to matters connected with military transport. And, secondly, as regards the portion under military control, the maintenance, to the utmost extent practicable, of the existing system under which the traffic of each line is conducted, retaining the services of the working staff and operatives, supplementing them to such an extent as may be necessary, and placing over them military Staff Officers who, while dictating the services required and ensuring their actual performance by personal supervision, shall at the same time interfere as little as possible in technical details. It is absolutely necessary that the Officers so employed shall have complete control over, and be entirely responsible for, the proper working of the lines, or sections of lines, over which they are placed; competent railway engineers and other skilled officials are therefore appointed as their assistants in all technical matters.

At the commencement of the war in 1870, France had no organized system for conducting military railway-transport. A scheme for such an organization had indeed been prepared a year or two before in great detail, through the efforts of Marshal Niel, but it had never come into operation, nor does it appear that the Army generally was aware that any such steps had been taken. When the war broke out, the railway companies received orders and requisitions from a host of military authorities, independent one of the other; these orders were often of a contradictory or impossible nature, and the greatest confusion was the consequence.

The object of this paper, however, is not to relate the failures and shortcomings of the past, but to give a general sketch of the system of railway organization and the code of regulations now existing in France, for the management of military transport for strategical operations; these were mainly prepared by the Military Railway Commission, which was assembled under the presidency of General Saget, in the latter part of the year 1872. The regulations bear the date 1st July, 1874, but are modified by the Decree of the 27th January, 1877; the latest edition being that of 1878. The entire code is divided into two distinct parts—one dealing with the ordinary transport of troops during peace, the other with transport for strategical operations; it is with the latter only that we are at present concerned.

All questions relating to the use of railways by the Army are dealt with by the Superior Military Railway Commission permanently established at the War Ministry, the composition of which is as follows, viz.:—

President.—A General of Division.

Vice-President.—A General of Brigade.

The civil members, nominated by the Minister of Public Works, are, a superior functionary from that Ministry, and two delegates from the syndicate of the railway companies.

The military members, nominated by the Minister of War, are, a

Field Officer of the Staff, a Field Officer of Artillery, and a Field Officer of Engineers, for matters special to their respective services; a functionary of the Intendance; a *chef d'escadron* of the Staff, as secretary and adviser with respect to movements of men and material; and a superior Officer of the Navy.

In connection with each of the six great railway companies of France, a Commission of Study is instituted composed of a Field Officer of the Staff and a superior functionary of the railway company; their duty is to make themselves masters of all details connected with the line, and prepare schemes for the movements of troops thereon under every eventuality that may arise, having reference to mobilization and concentration for strategical purposes. The minor railways are for these purposes considered as attached to one or other of the six great companies. The following are the principal points which these Commissions have to consider:—

The choice of the routes which shall be followed under each of the several conditions contemplated.

The number of trains which can be forwarded in a day according to the working capabilities of the line and other circumstances.

The number of engines, and amounts of rolling stock required.

The selection and preparation of stations for departures, arrivals, and for the halt of troops on their journey.

Twice a year they render to the Superior Commission reports embodying the results of their labours, which are examined, modified when necessary, and preserved for use. In addition to these reports the military member of each Commission, with the assistance of the Staff of the Army Corps, and the recruiting authorities, is required to render an annual statistical statement showing all details connected with the movements by rail of men in the reserves and men at the disposal of the active Army, who would be required to join on mobilization, and also marches which must be performed concurrently with the railway journeys so as to accelerate a general movement. These, although prepared by the military member, are examined by both members jointly before being transmitted to the Superior Commission at the War Office.

In all these matters they are guided by instructions, both general and special, emanating from the Superior Commission, which in its turn receives general directions concerning the more important questions from the Minister of War; and when necessary the Commissions of Study are brought together or grouped, as may be found convenient, so as to ensure a perfect co-operation and agreement in their schemes.

For strategical operations it is the duty of the Superior Commission to select for each line of railway transition-stations, at which the working of the lines shall cease to be under the management of the railway companies, and from which towards the Army the entire control shall be in the hands of the military authorities. They are also to determine magazine-stations at which shall be created magazines of the first, second, or third class, where shall be collected war material, and provisions for the supply of the armies on taking the

field, magazines of the first class being as far as possible established either in fortresses or under the protection of their guns.

When troops have to be transported by railway for strategical purposes the Superior Commission exercises the very extensive powers conferred upon it by the decree of the 14th Novmber, 1872. It is authorized to delegate its powers, either wholly or in part, to an Executive Commission, composed of two of its members, one being the President or the Vice-President, the other a member possessing the requisite technical knowledge; a third member may also be added at discretion. These are nominated by the Commission itself, which also determines the extent and duration of the powers thus delegated.

During strategical operations involving railway-transport, the Superior Commission sits permanently at the War Ministry, its *personnel* being augmented as may be found necessary; it constitutes the sole channel of communication between the War Minister and the territorial authorities on the one hand, and the chief administrative authorities of the railway companies on the other.

When mobilization is ordered, the Superior Commission immediately warns the railway companies to proceed with the execution of the schemes already planned for the transport of the men in reserve and at disposal. At the same time the Commissions of Study are transformed into Line Commissions for the railways with which they have been connected, their sphere of action and residence being defined by the Superior Commission according to the work to be performed, and subordinate assistance being provided from the territorial army. They continue to act as the agents of the Superior Commission, to whom they report and from whom they receive all their instructions. All the necessary particulars for their guidance are furnished to them from the documents previously prepared, and they are entitled to claim the assistance of the Army Corps Staff Officers who, in each region, regulate the movements of troops by rail. A daily report is rendered by them to the Superior Commission.

When the concentration of the forces is contemplated, the Superior Commission gives timely warning to the railway companies to collect their rolling stock, and to take all other necessary steps; when these involve any expenditure by the companies. these orders guarantee that it will be defrayed by the War Ministry. At the same time it furnishes the War Minister's Staff with tables of the transport service, upon which are based the orders which the troops must receive for the movement.

The Line Commissions are placed in possession of the prepared tables affecting their sphere of operations, and it is their duty to ascertain that the companies have given the proper orders to their subordinates, and that the Commanders of the troops are in possession of their orders for the movement; this latter information is obtained by communication with the Staff of the corps concerned.

For this purpose, to each of the stations which have been previously selected on the several lines by the Superior Commission, a Route-Station Commission (*Commission d'Etapes*) is appointed, composed of a Field Officer or Captain, a railway functionary as

the technical agent or station-master, and at stations where the troops are to halt for meals, an Officer of the Intendance with subordinate assistance is furnished from the ranks of the territorial army.

In every Army Corps region, the requisite *personnel* for these Commissions is nominated beforehand, and the order for mobilization specifies which of them shall at once enter upon their duties. The Route-Station Commission is furnished with an extract from the previously prepared tables of transport already mentioned, containing all details with which it is concerned; it receives its orders from the Line Commission, or, under very urgent circumstances, direct from the Superior Commission. It regulates all local arrangements necessary for the execution of the general plans for railway transport service; takes the necessary steps for ensuring the issue of food, the comfort of the sick and wounded, and, in concert with other authorities, the provision of quarters for troops on their passage.

In the execution of these duties, although united in one body for the purpose of securing co-operation, each member of the Commission is responsible for the services specially appertaining to his position. The military member is placed in the position of a Commandant, to whose instructions all who come within the area of his command must conform, whatever may be their rank; his principal duties are the following:—

He maintains strict order at and around the station, allowing only such troops as can be immediately conducted to their platforms to enter it; he prepares all military details connected with the operation of entraining, so that, on the arrival of the troops and material, he may at once indicate to their commander the platforms to be used and the allotments of the carriages and trucks; he personally sees that these allotments are strictly observed. It is his duty previously to ascertain from the local military commander that the troops about to proceed are in possession of the proper orders. He assembles all individual soldiers arriving at his station for passage, marshals them in groups suitable to the trains they are to enter, and marches them to their proper platforms. He makes provision for the orderly formation of all troops and material detraining, and the clearance of the platforms and station as rapidly as possible. To assist him in this, he is informed daily by the local military authorities of the destination of each body of troops expected during the next twenty-four hours, whether they are at once to proceed by march route or to await further orders, &c. When trains halt at his station for any purpose, and especially when it is to enable the troops to take a meal, he takes care that all necessary preparations are complete before the arrival of the train, and is present at every arrival and every departure.

The railway technical member, or station-master, is, on the other hand, solely responsible for the movement of trains, and their production at the proper platforms at the prescribed hours according to the time-tables or other special orders received, and for the execution by the railway agents and operatives under his control of all duties connected with the technical service of the line at his station. In

all matters connected with the maintenance of order and regularity, such as the erection of barriers, the opening and closing of doors and of refreshment-rooms, &c., it is his duty to conform to the requirements of the military member.

These two members jointly prepare a diary of all proceedings at the station, and a daily report, with extracts therefrom, is transmitted to the Line Commission. The Officer of the Intendance provides for the supply of the troops, under definite instructions on this head received from his superiors.

In the performance of their duties the Superior Commission, the Line Commission, and the Route-Station Commission, each enjoy the free use of the telegraphs, whether belonging to the State or to the railway companies, priority being given to matters relating to the running of the trains.

If, from any cause whatever, a body of troops cannot proceed by the train allotted to it, reference is at once made by telegraph to the Superior Commission, who issue instructions on the subject, so that the general plans may not be disarranged by partial action.

The Superior Commission, in accordance with the general plan, and with reference to the existing magazines and other local circumstances, determines for each Army Corps region, a station of departure (*gare point de départ d'étapes*), to which is appointed a Route-Station Commission, whence are despatched all persons and *matériel* to be conveyed from the region to the Army Corps which has occupied it; the *personnel* being consigned to the *transition station*, and the *matériel* to the *magazine station*. On the other hand, all persons and *matériel* sent back from the Army Corps, and destined for any place within the region, are consigned to the station of departure, and thence distributed through the agency of the Route-Station Commission.

From the moment that the Minister of Public Works notifies to the railway companies that they are required to place all their means of transport at the disposal of the War Minister, the necessary steps are taken for clearing the line of ordinary traffic. Trains *en route* continue their journeys, discharge their loads, and the empty carriages are despatched to the station from which the military trains are to start. The public is advised of the state of affairs by placards on all the lines concerned, and station-masters warn the owners to remove merchandise awaiting despatch or delivery.

Stations specified as points of departure, arrival, or as halting places for the troops, receive, when necessary, an addition to their staffs; appliances suitable to the service to be performed are provided, such as stages for loading and unloading, additional lighting and telegraphic apparatus, casks and buckets for watering horses, &c., and the execution of such constructions at the stations or along the lines, as have been determined by the Superior Commission, are at once proceeded with.

The foregoing arrangements refer to transport on the home side of the transition station; we now come to the system of conducting the traffic beyond that station.

At the head-quarters of the Army is established a Field-railway

Direction (*Direction des Chemins de Fer de Campagne*) consisting of a General Officer, or Colonel, and a railway engineer; the former, whose authority is supreme, has under his orders a Field Officer of Engineers, a Field Officer of Artillery, an Officer of the Intendance, and other Officers of different branches of the service; also railway officials, in number proportioned to the magnitude of the operations; a Chief Paymaster is also attached to the Commission; its *personnel* is nominated beforehand on the recommendation of the Superior Military Railway Commission.

The Field-railway Direction receives its instructions directly from the chief of the staff of the Army, and controls all railway transport between the transition station and the different fractions of the armies in the field, its subordinate agencies being Military Field-railway Commissions, each exercising its functions within such limits as may be assigned to it, and the Field-railway Route-service commands, established at the principal stations on these sections.

To ensure co-operation with the authorities governing the railways within the base of operations, the Field-railway Direction is in daily communication with the Superior Commission at the War Ministry, and also with the Route-Station Commission established at the transition station, which latter, as a general rule, receives its instructions from the authorities within the base, but under urgent circumstances must conform to the orders of the Field-railway Direction.

The principal subjects upon which correspondence takes place between these two separate authorities are the following:—

The transfer of railway *personnel* and *matériel* from one sphere of action to some other, either permanently or temporarily; the interchanges of the time-tables established by each within its own network: daily information concerning transport consigned by each to the transition stations; matters concerning trains echeloned along the lines as magazine trains; and the alteration of the transition station either forwards or backwards, with the modifications thereby caused in the working of the lines. This last step requires the personal approval of the Commander-in-Chief.

The Field-railway Commissions are composed of a Field Officer as President, whose authority is paramount; an Engineer Officer in command of the railway-troops allotted to the district; an Officer of the Intendance; and a railway engineer; a Paymaster is also attached to it. In peace time three such Commissions are maintained complete in their *personnel*, each of which assembles annually for at least a fortnight, for the study of some portion of the French railway network indicated by the Superior Commission at the War Ministry.

The executive agents for working and maintaining the field railways consist of detachments of the railway workmen belonging to the Engineers, supplemented by railway operatives taken from among such employés of the railway companies as are liable to military service. The requisite rolling stock and other material is supplied by the railway companies on the requisition of the Superior Commission acting on the information of the Field-railway Direction.

The Field-railway Commissions are entirely under the control of the Field-railway Direction; they are charged with the execution of all works connected with the construction, repair, and maintenance, as well as the destruction of the lines and structures connected therewith; the selection and establishment of suitable stations for army transport purposes; the entire train service; the military protection of the lines, buildings, and trains; and in general, the duties connected with the route-service within their sections, with reference to all detachments and individuals passing to or from the Army. Each of these Commissions has allotted to it a detachment of *gendarmerie*, for the police duties of the stations and trains, subordinates for office duties, and sufficient troops for the protection of the lines and trains.

At each of the principal stations within the sections controlled by these Commissions, is established a military route-service command. The commandant is a military Officer, having, as his assistants, a station-master, taken either from the special railway troops or from the employés of the railway companies liable to military service; an Officer of the Intendance, when necessary; and an accountant. In each Army Corps province the *personnel* for two such commands is designated beforehand; in war time they constitute the local agencies by means of which the Field-railway Commissions carry out their duties.

The station commandant receives all his orders from the Commission within whose section he is located, and exercises the chief control at his own station; he is furnished with a detachment of troops, and, when necessary, of *gendarmerie* also, and the necessary clerical assistance for his office.

As a general principle, the details of the work connected with transport beyond the base of operations must be carried out in conformity with the regulations for ordinary transport, in so far as they are applicable, all private traffic, however, being as a rule excluded from the lines. The railway companies are forbidden to accept for transport to the transition station, or to any station beyond it, any property not belonging to the military service, except with the express sanction of the Superior Commission.

On each of the railways leading directly to the Army in the field, the military railway direction appoints one or more terminal field stations (*stations têtes d'etapes de guerre*), selected on account of the facilities they afford for the reception and distribution of supplies for the Army and the retransmission of what it is desirable to remove; each of these stations is allotted for the reception of trains carrying men or material to one or more Army Corps. The situation and allotment of these must, of course, vary according to the operations of the campaign; timely notice of all such changes is given to the Army Corps Commanders, and to the Superior Commission at the War Ministry, so that the proper orders may be issued to all other functionaries concerned. These stations are specially prepared to fulfil the uses to which they are destined—the platforms, sidings, sheds, and other means of shelter, &c., are allotted to special uses, and supplemented

when necessary—but no magazines or depôts must be established within the station itself.

The daily time-tables for all trains running between the transition station and the terminal field stations are fixed by the Field-railway Commission within whose section the line runs. These tables provide, not only for the train service to and fro between those stations, but also for a certain number of through trains, travelling without break, either from the magazine stations along the home lines, or from the departure stations within the Army Corps regions. Special trains, not included in the time-tables, are dispatched only on the order of the Field-railway Commission, which is given only under the following circumstances, viz. :—To provide for the safety of the railway itself; or on an express order from the Field-railway Direction; or on a written requisition from a General Commanding an Army Corps, declaring on his own responsibility that such a step is absolutely necessary. Each train in the time-tables is numbered, those proceeding in one direction are given the odd numbers, and those in the opposite direction the even numbers. No train is allowed to start before its appointed hour, nor until the expiration of ten minutes from the departure of the train or engine preceding it in the same direction.

On a double line of rails, only one (the left) line is used in the same direction, and this rule must only be departed from in cases of accident, or when the line is under repair at certain places, and then only when the greatest precautions against collision are previously taken. The railway transport regulations contain most minute instructions of a technical character, relating to the movements of trains, signals, precautions against accidents, &c., applicable to the single as well as to the double line; these are doubtless drawn from the traffic rules in force for the ordinary service of the lines. They also contain every detail connected with the forms to be observed in obtaining transport for men and material, prescribing minute rules respecting tickets, the reception and delivery of goods, payments where civil traffic is allowed, and a host of technical details, only suitable to the particular modes by which traffic on the French railways is conducted, and therefore not very instructive to a stranger. It is more profitable to notice such portions of the regulations as are not only highly interesting in a military point of view, but which may also be considered to be more or less applicable to military railway transport generally.

It has been recently decided, by the Minister of Public Works, that a military train may consist of as many as fifty carriages (or, in railway parlance, *coaches*, a useful term which embraces every kind of vehicle in the composition of a train, the engine alone excepted). It must never exceed this number where the number of passenger-carriages in its composition is more than four; where there are no more than four such carriages, the train is considered to be a goods train, and treated accordingly. The maximum formerly authorised was forty, but this was found in some instances insufficient to convey entire tactical units at their war strength.

The principle upon which the trains carrying the combatant units

are made up affords special facilities for dividing the train into two halves, should such a step be necessary, either to overcome difficulties in traction or for any other purpose; each half being fairly complete in a military point of view; this will readily be seen on reference to the composition of trains for each arm, presently to be noticed.

The average speed of military trains conforms, more or less, to that adopted in the ordinary goods traffic, and is thus estimated under ordinary circumstances:—30 kilometres (18·6 English miles) per hour for trains having a maximum of forty coaches; 25 kilometres (15·5 English miles) when they have from forty to fifty coaches. This does not include any periods during which the train is halted, nor does it allow for the diminution of speed on approaching and leaving halting-stations or for other occasions, all of which must be separately calculated. The regulated halts for the convenience of the troops are—a halt of fifteen minutes at the expiration of an hour or an hour and a half after departure; fifteen minutes at the end of every three hours or thereabouts; two halts for meals every twenty-four hours of the journey, each lasting from one to two hours. Where time has been lost and has to be regained, these latter may be reduced to forty-five minutes as a minimum, and the former to ten instead of fifteen minutes.

The relations existing between the commander of the troops *en route* and the working staff of the line are governed by the principle of mutual non-interference in technical duties. The entraining and detraining of the troops, &c., are conducted entirely under the orders of the military commander; but, from the moment the carriage doors are shut, the conduct of the train is exclusively in the hands of the railway guard. The only exception to this rule is, that when the Commander of the troops has reason to believe that the train may be attacked, he himself may assume the direction of the train on his own responsibility, and all concerned must obey his orders.

In strategical movements by rail, the troops receive the whole of their bread rations before starting; but if the duration of the journey exceeds forty-eight hours, a fresh issue is made at some route-station: they also carry with them one cold meal cooked under their own arrangements, receiving in addition every twenty-four hours, at the prearranged halting stations, coffee in the morning and a hot meal at evening, each day; the cold meal they carry with them is renewed for the following day, when necessary, through the agency of the troops at one of the route-stations, under established regulations. On journeys lasting twenty-four hours the hot meal is, when possible, provided in some barrack near to the halting station, an officer from which attends to conduct the troops to and fro; for lesser journeys, each company usually makes its own arrangements for meals.

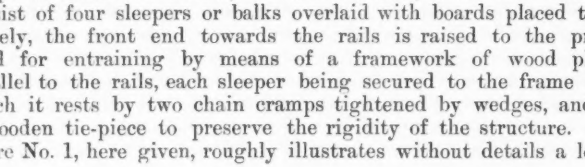
The horses of all services are watered and fed on the journey according to the regulations applicable to cavalry, which will be presently noticed.

For large operations, the troops themselves can be employed in the preparation of the stations, when the existing accommodation for entraining and detraining is insufficient. It is not considered neces-

sary that infantry soldiers should have a regular platform, although in some cases it may be advisable to heap up the earth or ballast to form a sort of banquette to facilitate access to the carriages when large numbers are concerned; but for cavalry and wheeled vehicles platforms are constructed of sufficient length, where possible, to enable a whole train to be filled or emptied at once, estimated at from 273 to 327 yards. These are constructed, when circumstances permit, alongside of a siding; the breadth given to them at the top is at least 13 feet, when they are accessible throughout their length by a continuous ramp, and 26 feet when ramps can only be placed at certain points. The inclination of the ramps varies from $\frac{1}{10}$ to $\frac{1}{6}$ as a maximum; the face of a temporary platform is usually reveted with timber or sods; the platforms are continued round the ends of the sidings when possible, so as to form what is termed with us a dock, to be utilized for loading endwise.

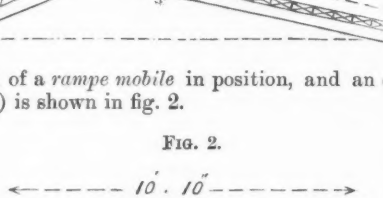
Portable ramps (*rampes mobiles*) are also largely used, and as they can be conveyed in pieces from the stores in which they are preserved to any part of a line of railway, and very readily put together, the erection of ramp of any required length occupies little more time than that necessary for their transmission. The wooden portable ramps intended for horses, wheeled vehicles, and other material, consist of four sleepers or balks overlaid with boards placed transversely, the front end towards the rails is raised to the proper level for entraining by means of a framework of wood placed parallel to the rails, each sleeper being secured to the frame upon which it rests by two chain cramps tightened by wedges, and by a wooden tie-piece to preserve the rigidity of the structure. The figure No. 1, here given, roughly illustrates without details a longi-

FIG. 1.



tudinal section of a *rampe mobile* in position, and an elevation of the front frame (*a*) is shown in fig. 2.

FIG. 2.



The ramp being 18 feet long, and the height at which its front stands above the ground being approximately 3 feet 8 inches, its incline

must be about $\frac{1}{5}$; the length it occupies along the line is of course equal to that of its front frame, viz., 10 feet 10 inches, which stands $35\frac{3}{8}$ inches from the centre of the nearest rail. The weight of the whole of the parts together is about $29\frac{1}{2}$ cwt.

For conveyance with the cavalry and artillery trains, so as to enable them to be unloaded at any part of the line where no platform exists, there is a smaller pattern of portable ramp partly constructed of iron, the length of which is 16 feet 5 inches, and the breadth of front 7 feet 10 inches; it is furnished with iron claws for hooking on to the edge of the trucks instead of resting on a front frame, and can be applied either to the sides or ends of the trucks as may be requisite. A pulley is supplied with each of these smaller ramps for use in difficult cases, as the incline is greater than in the other kind of ramp. Other appliances for entraining and detraining consist of wooden stages (*ponts volants*) of two kinds: the first, intended to aid in the entraining of horses and vehicles from platforms by forming a connection between the platform and the truck, is 4 feet 11 inches in length, and the same in breadth; it has iron fittings to connect it with the side of the truck, and battens across its flooring to prevent the horses slipping. Two such stages of rather less breadth are provided for each portable ramp of the heavier class to connect the top of the ramp with the truck. The other description of stage is for the purpose of connecting endwise the floors of the trucks, so as to make a continuous passage from truck to truck when end loading is resorted to; its breadth is 3 feet $3\frac{1}{3}$ inches (1 metre), but its length varies from that to 5 feet 6 inches, according to the length of the buffers used by the different companies.

The transport of infantry by railway is conducted in the following manner.

On the receipt of the order a regimental Officer, specially told off to superintend details connected with the movement, is sent to the departure station to make himself thoroughly acquainted with, and to report upon all its arrangements. On the day fixed for the movement this Officer, accompanied by a *sous-officier* selected as his assistant; the baggage detachment, consisting of the regimental transport and Officers' horses, under charge of the baggage-master; a detachment of men to render assistance, together with a guard bringing with them men in confinement, precede the troops to the station by half an hour. The Officer proceeds to examine the train and note the allotment for each truck, his assistant following him and as fast as possible marking each truck with chalk, giving those intended for men, horses, and *matériel* each a separate series of numbers, and at the same time marking the number of men or horses each will contain; these marks are made on the footboard between the doors of passenger carriages, and on the sides of the horse-trucks.

Soldiers equipped and armed are allotted to the carriages in the proportion of ten ordinary places for nine men if the journey does not exceed 93 miles, and ten places for eight men for greater distances, the vacant places being used for the knapsacks and other equipment.

The Officer then directs the baggage-master to the proper place for

entraining his charge, the work being performed by the troops in co-operation with the railway officials. The horses are entrained under the rules applicable to cavalry, which will presently be noticed, and the regimental transport carriages, which are mostly two-wheeled carts, are conveyed at the rate of two per truck; the wheels being scotched and the bodies lashed.

The troops themselves must arrive at the station three-quarters of an hour before the departure of the train. The Officer sent before hands to the commander a statement showing the allotment of the railway carriages according to their numbers; the battalion is drawn up in the most convenient spot, previously selected for the purpose; the *sous-officiers* and others are placed in the ranks, and the Adjutant-Major proceeds to tell them off into squads corresponding to the contents of the carriages without distinction of companies, each squad being indicated as No. 1, 2, 3, &c., according to its position in the line. During this operation the *sous-officiers* and corporals are distributed among the squads, in each of which a *sous-officier* is named chief of the carriage. The pioneers, the band, drummers, and buglers maintain their relative positions and occupy the foremost carriages. In proceeding to the platform each squad marches at two paces distance from that in front of it, and is halted by its own chief, fronting the carriage bearing its number. By forming fours deep the squad is made to occupy the same length of platform as the carriage. At the proper bugle-sound the men take off their packs and bring their pouches to the front, the bandsmen and drummers depositing their large instruments and cases in the baggage van at the head of the train. Two men then enter each compartment, the rest passing their packs to them in succession for arrangement under the seats and in the vacant places. When seated the men hold their rifles between their knees. They are forbidden to shut the carriage-doors, this being done by the railway officials only.

When all the troops are in the carriages, the entraining Officer's assistant marks with chalk by the side of the number of each carriage the designation of the company which occupies it, and the chalk marks are all repeated on the opposite side of the carriage, the men being required to remember them. The guard, commanded by an Officer, and consisting of a sergeant, corporal, bugler, and fifteen men, which accompanies the baggage detachment to the station and is in charge of prisoners, is placed in the carriage next in front or rear of the Officers' carriages. The Commanding Officer, accompanied by the Officer of the guard, the station-master, and the guard of the train, makes a rapid inspection of the whole train before taking his place.

During the journey the men are forbidden to put their heads or arms out of the windows, or to open the doors, raise cries, or smoke either in the horse-trucks or in carriages where straw has been provided for the sake of warmth in cold weather.

The Officers are informed beforehand of the stations at which the trains will halt for ten or fifteen minutes, to enable the men to get out of the carriages. At these stations the company Officers proceed to their men's carriages, the regimental guard places such sentries as are

necessary to prevent men straying or entering forbidden places. When the bugle sounds the *Halt* the men are at liberty to quit the carriages at the proper side only, leaving their arms behind them. Three minutes before the train again starts the bugle sounds the *Advance*, when the men must return to their places.

Advantage is taken of these halts for the Officers to visit the horses and *matériel*, to see that all is in order; and on every other occasion of the train stopping for five or ten minutes it is the duty of the Officer of the guard, who travels in one of the Officers' carriages, to make a rapid survey of the train, when, if he thinks proper, he can allow any particular men to descend on urgent necessity.

At the station preceding that at which the troops are to detrain they are properly warned to get themselves ready; on arrival the Commanding Officer at once inspects the station and makes all arrangements for parading them, placing such sentries as may be necessary, and telling off a portion of the guard to take charge of the baggage, while the same Officer who made arrangements for the entraining takes in hand all details connected with detraining of the horses and *matériel*. At the proper bugle-sound the men leave the carriages, the two last men in each compartment handing out their knapsacks, which the men put on and form in squads opposite their respective carriages in the same way as on entraining. In this order they leave the station, and are formed by companies outside. Meanwhile the train is searched by the *sous-officiers*, aided by the railway officials to ascertain if anything has been left behind. The baggage-guard, with a detachment told off to assist, proceed to the platform at which the baggage and transport is to be detrained, under the superintendence of the baggage-master; the Officers' horses are first taken out and afterwards the rest of the horses and *matériel*. When no regimental transport accompanies the troops, the baggage-master makes arrangements for the conveyance of the baggage under certain definite regulations.

The carriages used for the conveyance of troops are:—first class, reserved for Field Officers; second class, for other Officers; third class, for non-commissioned officers and men; this regulation is, of course, modified when circumstances render it necessary. In large operations, owing to the comparative paucity of passenger carriages in France, as in other Continental countries, troops are, to a considerable extent, conveyed in covered goods wagons, fitted with seats for the purpose in the manner most suitable to the wagons in use by the different companies; thus, a covered goods wagon of the Eastern Company, 17 feet 10 inches by 8 feet interior measurement, is fitted for 30 men, sitting in the same manner as in the ordinary English passenger carriage. The space opposite the central door is left clear, and in it the knapsacks and rifles are stowed, thus rendering it unnecessary to leave any of the seats vacant for this purpose. Openings to serve as windows are made in the upper part of the sides of the wagons. On long journeys the Commanding Officer is at liberty to interchange men between these and the ordinary passenger carriages—altering, of course, the marks on each to suit the change of companies, &c.

An infantry train is made up as follows, and is intended to carry a battalion complete, viz.:—

The engine and tender.
The guard's van, containing also Officers' baggage, &c.
Part of the soldiers' carriages.
The Officers' carriages.
The other part of the soldiers' carriages.
A baggage truck supplementary to the guard's van.
The regimental transport carriages and horses.
A break van.

The general rules applicable to the transport of infantry are, with some modifications, applicable also to the men of the mounted services, and the preliminary steps with reference to the appointment and duties of the regimental Officer supervising the arrangements, are also very similar.

There are two recognised methods of arranging troop-horses in the cattle trucks, according to the dimensions of the truck. The one is to place them in two rows facing each other, the tails of the horses being against the ends of the trucks, and their heads towards the centre, where there is left an interval opposite the doorway; each horse's head-rope is secured to a ring in the roof, placed sufficiently far back over his shoulder to prevent a forward movement, and a cord is stretched from side to side of the wagon in front of their breasts. In this manner eight horses can be placed in a truck, four in each row; excepting only *cuirassier* and *gendarmerie* horses, three of which form the row, that is six per truck.

The minimum interior length of the truck to suit this method must be 17 feet 8½ inches; in trucks of less length the horses stand transversely, that is at right angles to the rails, all facing the same way and the head-rope of each being tied short to a ring in the side of the wagon. In calculating accommodation by this method, the following is the breadth allowed for each horse, viz.:—

	English inches.
Light cavalry, unsaddled	21·65 to 23·62
Do., saddled	23·62 to 25·59
Cavalry of the line or reserve, or a draught horse with harness, unsaddled	23·62 to 25·59
Do., do. saddled	29·52 to 31·49

thus, from seven to nine horses can be placed in each truck.

In the absence of special orders to the contrary, horses are always unsaddled; this is considered necessary, particularly on long journeys, both for the sake of the horse and for the preservation of the saddlery; as a rule draught horses keep on their harness. Two men as a stable guard travel in each.

When the method of entraining first described is employed, the saddles are piled in the space opposite the door, the rations of corn being kept there also; but when the transverse method is used, special wagons are allotted to the saddles and corn, at the rate of about sixty saddles to a wagon; the rations of hay are carried in separate

covered wagons; in packing the saddles, the crupper, breast-plate, girths, and horsecloth are gathered up on the seat of the saddle and secured, there by means of the surcingle, the stirrups are also taken up and secured; to prevent injury to the saddles and to keep them in position when piled one on the other, the lowest saddle is placed across a cylindrical pad of straw, tightly bound together, 4 feet 3 inches long and 15½ inches in diameter, requiring each about 26½ lbs. of straw; these are made up by the men in barracks before starting. Straw to litter down the floors of the wagons is also drawn by the troops at the rate of 5½ lbs. per horse.

The last feed is given to the horses at least two hours before entraining, after which they are watered; their daily ration during the journey consists of 11 lbs. of hay and nearly 4½ lbs. of corn; entire rations for the journey, provided it does not exceed two days, are drawn before starting.

Each soldier is provided with a cloth label with his name, number, &c., upon it, to affix to his saddle, in such a manner that the name may be easily read.

As in the case of infantry, the Officer having charge of the entraining, the baggage detachment, the guard, forage, &c., precede the troops to the station, and the marking of the carriages is performed.

For *gendarmerie* and cavalry of the line or reserve, ten places are allotted to eight men; for light cavalry, ten places to nine men if the journey is under 93 miles, otherwise ten places to eight men.

The troops themselves arrive one hour and a-half before the time of departure—they are drawn up in single rank opposite the entraining platform, the rear rank man on the left of his front rank man, the *sous-officiers* and trumpeters entering the ranks—the Commander then tells them off in squads according to the content of the trucks, allotting a *sous-officier* or brigadier to each, they then dismount and place their carbines and swords in piles at sufficient distance to be out of the way, the helmets and cuirasses being deposited by the side of the arms. The horses are then unsaddled, the men of each file alternately holding both horses during the proceeding; if the horses are to stand parallel to the rails, the saddles are in the first instance placed behind the ranks, to be arranged in the same trucks after the horses are entrained; if the other method is adopted, the men of each file carry their saddles in succession to the saddle trucks, in each of which, ready to receive them, are a *sous-officier* and four men, previously instructed in the proper method of stowing them away, who have by this time arranged the straw pads for the lowest saddle of each pile; the horses keep their bridles on.

It is the duty of the railway employés to properly place the stages at the doors of the trucks before they are opened, and to remove them after they are closed; while the horses are entering a trooper stands on each side of the stage, to prevent them getting crosswise upon it and their feet from slipping between the truck and the platform.

To entrain the horses so that they shall stand in the trucks parallel to the rails; on the order being given, the first man of each squad

leads in his horse, the bridle being still on, turns to the right and places him close to that side of the wagon by which he entered, head towards the centre, each succeeding horse of the same row being formed upon him: when one row is complete a cord is stretched in front of the horses' breasts, secured to the sides of the truck by rings; the men fasten the head-ropes to the rings in the roof and go for their saddles. The opposite row is formed in a similar manner, and the saddles are then piled in the central interval; the two men of the stable guard leave their arms and head-dresses with their comrades, and as soon as the journey has commenced and the horses are quiet, they take off their bridles and stow them carefully on the piles of saddles.

When the horses are to stand perpendicular to the rails the horses are led off in succession, and on entering the truck are turned alternately to the right and to the left, so that the two ends of the truck are first occupied and the centre places reserved till last; each man fastens his horse's head-rope as short as possible to the ring in the side furthest from the platform, takes off the bridle, and returns with it to his place in the ranks; the two last horses are not passed in till the others are secured, and the men have left the truck; their riders form the stable guard, which is relieved every three hours. These men are accommodated with two portable seats (*strapontins*), slung by ropes against the side of the truck and between the horses' heads, after they have been properly secured. The doors are shut the moment the two last horses are in.

The Officers' horses either accompany those of their respective pelotons, or are placed together in separate trucks, as the Commander may determine.

When the horses and saddlery have been disposed of the men take up their arms, helmets, &c., and fall in opposite the passenger carriages, to which they are then told off in the manner already described for infantry; the bridles, carefully made up, are placed under the seats, the helmets, &c., in the vacant seats, the swords and carbines are held between the knees; cuirassiers stow their cuirasses in piles under the seats, leaving room for the bridles. When the entraining is complete the contents of each wagon are carefully marked upon it with chalk by the side of its number, and each trooper is expected to remember the number of his own wagon as well as that in which he has placed his horse. As in entraining infantry a final survey of the train by the Commanding Officer takes place, and the instructions relative to the behaviour of the men during the journey, and when a halt takes place, as well as the arrangements for their meals, are the same.

The men of the stable guard are instructed to speak to the horses, and make much of them when the engine whistles, and when the train starts or halts; in case of accident they are to endeavour to attract attention from the windows. At the relief of the stable guard, and on other occasions, when the horses stand transversely, considerable care is requisite at the moment of opening the doors to avoid the accident that must happen if either of the horses opposite the door should

step back; at these times, therefore, the men stand at their heads, soothe them, give them a handful of corn, and divert their attention; the door is opened just sufficiently wide for the relief to step in and take their places at the horses' heads. The others quit the wagon quickly, and the door is at once closed.

During the journey the stablemen feed the horses by hand with small quantities of hay supplied to them periodically from the hay wagons as opportunities offer; at the feeding stations the corn is distributed in the corn bags, and the water-buckets are passed to the stable guard through the windows. These buckets are made of sail-cloth, and are supplied to the watering stations by the military authorities; the railway companies have, however, undertaken to construct in future all their new fire-buckets of the same pattern so as to serve for this purpose.

It will readily be understood that the method by which the horses stand in the trucks parallel to the rails is far more convenient than the other as regards the feeding, watering, and the general attendance of the stable guard upon the horses; the two men are better accommodated; it affords also the very great advantage of not separating the saddlery from the horses, and thus saves time in collection and redistribution, and the danger connected with the opening of the doors is to a considerable extent obviated.

The operation of detraining cavalry is precisely a counterpart of that of entraining, the order of proceeding being reversed.

The men descend with their arms and bridles, but helmets, cuirasses, &c., are left in the carriages until required; the arms are piled, and the men fall in. When the Officers have ascertained that each man remembers the number of the truck where his horse is, the Commander gives the word to detrain them, and each man proceeds to his proper truck; the saddles in the horse-trucks are first taken out and carried to the place of formation; each man then bridles his horse, leads him out in the order the reverse of that observed when entraining, and the squads form in single rank on the ground indicated.

In the transverse method of stowing the horses, the bridles of the two centre horses are passed in through the windows to the stable-guard, who put them on, and, on the door being opened, back out the horses and form up; the rest of the men enter, put on their bridles, and lead out alternately from right and left. The men who packed the saddles on entraining attend to their unloading, and when the squads are all formed the front rank men first go for their saddles, the rear rank men holding the two horses, when the front rank have saddled the rear rank go for their saddles; the arms, helmets, cuirasses, &c., are resumed in a similar manner.

A cavalry train is made up as follows, and is intended to carry squadron complete, viz.:—

Engine and tender.
Guard's van, containing also Officers' baggage.
A truck with saddles.
A platform truck with the portable ramps, if such are carried.
Part of the horse trucks.

One truck with saddles.
Part of the soldiers' carriages.
The Officers' carriage.
The other part of the soldiers' carriages.
The other part of the horse trucks.
The forage truck.
A truck with saddles.
A truck for regimental transport.
A break van.

Artillery are entrained on principles precisely similar to those already described with reference to the other two arms; they require, however, in addition to the stages already referred to, a certain amount of accessory material, lashings for the guns and wagons, pieces of board, large triangular wedges to help the wheels over the cross battens and raised borders of the platform-trucks, and hand-spikes. All regulations applicable to cavalry are observed with reference to artillery horses, and the draft horses retain their harness as in the other services.

For the transport of artillery carriages, platform-trucks of different patterns and dimensions have to be employed, the interior measurements, varying from 14 to 21 feet in length, and from 6 feet 7 inches to 9 feet 6 inches in breadth, some having smooth floors and others having projecting battens across the floors; some without any raised borders, and others having borders either at the sides only or all round, which cannot be let down.

Two complete field artillery carriages, including limbers, for guns of 7 centimetres or 12 centimetres, can be loaded on a truck which has a smooth floor, at least 19 feet long, if the end borders are fixed, and at least 17 feet 8 inches long, if these let down.

One carriage complete, with an additional body or limber, for the same guns, can be loaded on a truck having a length of floor between 14 feet 9 inches and 19 feet, whether it be smooth or constructed with raised battens; and, if the ends let down, a length of 17 feet 8 inches will suffice for either description of floor.

For batteries armed with guns of 4 centimetres or 5 centimetres, two complete carriages can be loaded on any truck having a minimum length of 17 feet 8 inches; and from that down to 14 feet 9 inches, a complete carriage, with an additional body or limber, can be carried.

No truck, of a length less than 14 feet 9 inches, can contain more than one complete carriage, nor can any of the trucks before specified, upon which a forge, forage, or store wagon is loaded, carry, in addition, more than one body or one limber.

The battery or detachment must arrive at the station two hours before the train starts; all the necessary information is at once given to the Commander by the Officer who has preceded the troops, and, according to his report as to the dimensions of the trucks, the guns, carriages, &c., are told off into proper sections for entraining, the Officers being distributed to superintend. This must be so arranged that the three hindmost trucks shall not convey any carriage containing ammunition. The leaders and centre horses are unhooked, the gun or carriage is

drawn to the place opposite the proper truck by its wheelers only, which are then taken out, and all the horses are formed up together.

The entraining of the carriages, &c., is effected either at the side or end, according to the construction of the platform. For end-loading, the carriages are in most instances brought up one by one to the dock, and when loaded passed to the line on which the train is being made up, by means of a turn-table or otherwise.

To load in this manner two wagons, or a gun and wagon complete, on one truck, two portable stages (already described) are placed to connect the dock with the truck; the first body is passed on to the furthermost end of the truck, trail towards the rear, wheels jammed against the end; the limber is then run on, its wheels being made to interlock as much as possible with those of the body, its pole[1] towards the rear, with the end resting on the floor; the second limber follows, pole foremost and elevated so as to rest upon the limber-boxes of the first; finally, the second body, trail foremost, passing under the limber and resting on the floor, wheels interlocking.

When only one complete carriage and an additional body or limber are to be stowed together, as soon as the first body is placed, as before, the limber is passed on, pole foremost, and elevated over the body, wheels touching, then the additional body or limber, with the trail or pole, as the case may be, also foremost, but passing under the limber already on. In either of the foregoing cases a wagon body which carries a spare wheel on a pintail behind, is the one to be passed on last, so that the wheels may not interfere with the elevated pole of the limber.

The method of loading by the side is as follows:—Two trucks, the first and second, are connected at their ends either by letting down the ends or by means of portable stages of the proper pattern, the side of the first truck is also connected with the platform by two portable stages; a body and limber are passed on to the first direct from the platform, and stowed, as already described, at that end which is furthest from the second truck; the side stages are then moved to the second truck, and the loading of the first is completed by running the pieces from the platform to the second truck, and thence to the first over the ends.

In this manner truck after truck is rapidly loaded, until the last is reached, when an alteration of the method becomes requisite. The proceeding, when two complete carriages are stowed together, is as follows:—The first body is passed on trail to the rear, and stowed with its wheels against the end furthest from the truck last loaded; the second body follows also trail to the rear, and is placed with its wheels resting on the stages which connect the truck with the one last loaded, care being taken to scotch the wheels; a limber is then run on pole to the rear, and is stowed so that its wheels interlock as much as possible with those of the first body; its pole is removed and placed on the floor along the furthest side of the truck, so as not to interfere

[1] The French artillery carriages are fitted with poles, not with shafts as in the English service.

with the stowing of the limber which is to follow; this is now brought on pole to the rear, and turned into its place, so that its wheels interlock as much as possible with those of the first limber, and its pole rests upon the boxes of the same; finally, the second body which has its wheels upon the stages is brought forward on to the floor of the truck, and the whole of the pieces stand in the same relative positions as on other trucks, the only difference being that one pole remains detached.

When less than two complete carriages are stowed together the proceeding is precisely analogous to the foregoing; and when there is a sufficient supply of portable stages and other accessory materials, the train can be told off into groups of two or more trucks, so that separate operations may be carried on simultaneously at each group.

When one complete carriage only (that is one body and one limber) is placed upon a truck the wheels are outwards, the trail and the pole towards each other, the trail on the floor, the pole elevated over the body.

In entraining artillery carriages the following precautions are necessary:—Care must be taken to distribute the weight over the floor of the truck, so as not to strain the springs; neither the poles nor the spare wheels must project beyond the buffers; the poles must not be raised before the proper time, so that the ammunition boxes shall not be swung about unnecessarily, and these latter must never be allowed to be in contact one with another; the several parts of the truck-load must be most carefully lashed and secured together, so as to give stability to the whole, and the scotches which are applied to the wheels must be nailed to the floor.

The entraining of the horses commences as soon as they are all freed from the carriages and formed up for the purpose; it is conducted in the same manner as for cavalry, as also is the stowing of the saddles, the entraining of the men, and other details connected with the operation. The *near* horses, namely those ridden by the drivers, are unsaddled like the rest of the riding horses; the draught horses retain their harness, and, in order to prevent the traces causing inconvenience, those of the wheelers are crossed under the horse's belly close to the girths, then brought round his body and secured together on his back near the withers; the long traces of the leaders and centre horses are first crossed over the back near the withers, then passed under the belly and secured together on the back.

The operation of detraining artillery is effected in a manner precisely analogous to the entraining, the order of proceeding being of course inverted.

An artillery train is made up as follows, and is intended for the transport of a battery complete, viz.:—

The engine and tender.
The guard's van, containing also Officers' baggage.
A truck with saddles.
A platform truck with portable ramps, if such are carried.
The horse trucks.
The forage truck.

A truck with saddles.
The Officers' carriage.
The soldiers' carriages.
The trucks with battery material, the three last without any ammunition.
A break van.

The pontoon equipment for an Army Corps is conveyed in three trains, each of thirty-four or thirty-five coaches; that for an army in six trains of similar composition. The trucks to convey pontoon carriages must have a floor-length of at least 17 yards 4 inches, and each carriage requires a separate truck.

The carriages of the Military Train (*train des équipages militaires*) are of many different kinds; some of their four-wheeled carriages do not lock under, and some are of unusually large dimensions, each of these must have a separate truck for its conveyance; others are of moderate dimensions, with their fore-carriages locking under, as in the pattern of 1874, which corresponds more or less closely with our general service wagon. Two of this latter description can be conveyed on a railway truck having a floor at least 19 feet 8 inches long and 9 feet 3½ inches broad; and one wagon of this kind, together with a two-wheeled cart, can be loaded on a truck with a floor 17 feet 11 inches long by 8 feet 2½ inches broad. Trucks of a length less than 17 feet 11 inches will carry only one wagon of any description, or two carts.

The process of loading two four-wheeled wagons on one truck is performed as follows, the loading being of necessity over the end of the truck, as the wagons cannot in this case be brought into their proper relative positions by side loading:—The first wagon, fore-carriage to the rear, is passed on and moved to one of the furthest corners, so that both the hind wheels touch the end, and one of those wheels is close to the side of the truck; the pole being removed, the fore-carriage is completely locked under, its axle-tree at right angles to the other axle-tree, and its splinter-bar turned outwards; this has the effect of getting the inner fore-wheel out of the way, and thus reducing the breadth occupied by the fore part of the wagon; the second wagon, fore-carriage foremost, is then run on, its wheels being kept close to the opposite side of the truck; its fore-carriage is completely locked under, splinter-bar outwards, similar to the other; it is then moved forward until the bodies of the two wagons overlap at the fore parts, the hind parts being at diagonally opposite corners of the truck; the fore-carriages are lashed together to keep them steady, and the hind wheels are secured to rings in the floor. If a crane is used for entraining the wagons, which is an exceptional proceeding, they are lowered at once into the positions above described.

To load one four-wheeled wagon and one two-wheeled cart on the same truck, the wagon is first passed on, and placed in the same position as in the operation just described, excepting that the fore-carriage is not locked under; the cart is then passed on shafts foremost, and the body in the corner diagonally opposite to the wagon

body, the shafts rest on the floor, one of them passing under the fore-carriage of the wagon, the other clear of it.

The instruction of the troops in the operations of entraining, when they are quartered in localities where it is impossible to make use of actual railway lines and rolling stock for this purpose, is carried out by producing a very fair imitation of the reality in the barrack-yard or drill ground, by the following methods, viz.:—For entraining and detraining military carriages, a rectangular framework of wood, 19 feet 8 inches in length, and 7 feet 2½ inches in breadth, is laid out upon the ground so as to represent the floor of a railway truck; the end pieces can be adjusted, so that any less length down to 17 feet 8 inches can be given to it according to the pattern of the actual trucks with which the troops are likely to be concerned. Another similar frame is placed in juxtaposition to the first, endwise, so as to represent a second truck in the same train, an interval of 3 feet 3½ inches between their ends being left as the space occupied by the buffers. A trench 3 feet 3½ inches broad at the top, and the same in depth, is then dug immediately outside the frames completely enclosing the space they jointly occupy; this represents the interval between the platform and the floor of the trucks, the level of the platform being that of the natural ground. In this manner it is possible to carry on exercises in entraining military wagons, &c., both by the side-loading and end-loading methods. This description of exercise is especially applicable to the soldiers of the Military Train, each squadron of which is supplied with all the necessary appliances of the same kind as are used on the actual railway. An additional advantage is gained whenever, from the nature of the ground, it is possible so to arrange that at one end of the space representing the trucks there shall be a drop to the ground-level of about 3 feet 3½ inches, which would serve to represent the case of entraining or detraining at any part of the line where no platform exists by means of the portable ramps carried in the train.

Similar exercises in entraining horses are conducted very much in the same manner, with the unquestionable advantage of accustoming the animals, as well as the men, to the operation. In this case the floor of the representative truck is made 18 feet 4½ inches in length and 8 feet 2½ inches in breadth; this space is enclosed by a railing 4 feet 3 inches in height, with an opening in the centre of each side 4 feet 11 inches broad, to represent the doorway. In each side of the railing are ten holes at a height of 3 feet 3½ inches above the floor through which to fasten the head ropes of the horses when they stand at right angles to the rails; and, when they stand longitudinally, two holes on each side serve for fastening the breast lines in front of the rows as before described. The trench outside the frames is in this case about 4 inches broader, and need only extend along the two sides. It is arranged, as in the former, that where circumstances permit, there shall be a drop of 3 feet 3½ inches from one of the sides to the ground level, to simulate the case of entraining or detraining the horses at any part of the line.

When the exercise has reference to the entraining of men only, the

rectangular spaces representing the railway carriages are traced upon the ground with the pickaxe or with cords, or in any other convenient manner, with the usual intervals between their ends; this suffices to indicate all that is necessary respecting the dispositions to be made, the subdivisions into which the troops must he told off, &c., any number of separate railway carriages may be thus typified as forming part of the same train, according to the number of men to be instructed and the extent of ground available.

The troops are also trained in all other details necessary for entraining operations, such as the preparation of the straw pads and stowing the saddles, the management of the harness, and arrangements to be made when horses have to travel with their saddles on, &c.

In countries situated as is France, with powerful neighbours keenly alive to the advantages derivable from the gain of a day, or even a few hours, in the concentration of their armies, it is scarcely possible to over-estimate the important results that might ensue from a careful attention to personal training of this description, in conjunction with a well-defined system for utilizing to the utmost the available railways. There can be no doubt that, in military movements, the carrying capacity of railways is restricted far more by the difficulties which attend the entraining, detraining, &c., of large bodies of troops than by considerations having reference only to the technical working of the lines, and every step taken to diminish those difficulties must, in a very great degree, clear the way for a corresponding reduction in the interval at which trains will follow each other upon the lines, and consequently in the time occupied in effecting the concentration of forces for offensive or defensive purposes.

The efficiency of the present regulations for large strategical movements remains, of course, to be tested; but that portion of the system which relates to the transport of troops during peace may certainly be said to have had a very good trial during the past year (1878), when very large numbers of reserve men were called out, in immense batches, for a few days' training, while at the same time others were being dismissed to their homes. The distances travelled by individuals were no doubt inconsiderable, but it must be remembered that the main features of the necessary arrangements depend but little upon distance. Judging from accounts given by the correspondents of our own press and the known arrangements of the Government with respect to the training of the reserves, it may be computed that, on more than one occasion, something like 100,000 men must have travelled by train on the same day in different parts of France, yet there appears to have been no derangement of the ordinary traffic, and it was even said that the travelling public were scarcely aware that any unusual movements were taking place. The country may, therefore, have good reason to hope that the still untried portion of the system may prove equally successful.

REPEATING RIFLES.[1] A SHORT ACCOUNT OF THOSE IN USE IN FRANCE, NORWAY, AUSTRIA, AND SWITZERLAND.

By Lieutenant WALTER H. JAMES, R.E.

PUTTING aside for the present all consideration as to whether magazine rifles will form the armament of the future or not, we propose, in the following pages, to give a short description of those which have already been introduced, or are in the course of introduction, by different Powers. Up to the present time, Switzerland alone has introduced a repeating rifle, the Vetterli, as the general armament of her infantry. Austria has for some time past armed her gendarmerie with the Fruwirth, and is now making experiments with the Kropatschek rifle, which may possibly, should financial considerations permit, be the future armament of her forces. Turkey, as we all know, has armed her cavalry with the Winchester rifle, the best of the older forms of magazine rifles. France and Norway have introduced the Krag-Petersen and Kropatschek into their Navies.

The experiments which have lately been made in the first-named of these two countries (France) are particularly interesting from their exhaustive character. Indeed, for rapidity and thoroughness of investigation, the French Committee may serve as a model for others. The trials commenced on the 6th November, 1877, the report was sent in on the 29th March, 1878, and on 28th June, the order was given for the definite introduction of a repeating rifle as the armament of the Navy.

The history of the reasons which led to its adoption are briefly as follows. Not long after the introduction of the breech-loading rifle, pattern 1866, into the French Navy, its many defects became evident. It was found that after a few discharges it was impossible to load with facility, the gas-check did not act efficiently, the needles frequently broke, and the cartridges rapidly deteriorated.

In 1869 a report was sent in to the Government from the Mediterranean fleet, to the following effect:—

"The rifle, pattern 1866, forms a great improvement in the ar-
" mament of the Navy. Its defects arise from its cartridge, and it
" would be well to call the attention of competent persons to this
" important question."

Similar complaints were made by the Army after the war in 1870–71, and in 1872 a Committee was formed for the purpose of enquiring

[1] For the information contained in this article we are indebted so far as the French experiments are concerned to a brochure recently published by Messrs. Tanera, of Paris, entitled "*Expériences exécutées par la Marine sur des Fusils à Répetition*," and which is itself an extract from the "*Mémorial de l'Artillerie de la Marine*."

into and remedying its defects. The result of the labours of this Committee was the adaptation of the Chassepôt, according to the system proposed by Major Gras, which permitted the use of a metallic cartridge.

The Navy, however, reserved its decision as to the form of rifle to be introduced. There was no hesitation as to the cartridge. The desirability of having the same as that in use in the Army was too manifest to admit of doubt. Nor were the advantages of the metallic cartridge over that of paper for one moment denied. But it was an open question whether, while still employing the same cartridge, a repeating rifle could not be found which might be used alongside the weapon of the Army, and yet possess the advantages which a rifle of this class was considered to offer for the Navy. So far back as 1866, indeed, experiments had been made in this direction; but the magazine rifles then known had the disadvantages of being very complicated and of firing a light bullet with a small powder-charge. Further, they all necessitated the use of a metallic cartridge. This last fact would not have prevented their introduction; but in face of their complication and poor ballistic qualities, it was felt that the advantage of rapid fire was not sufficient to warrant their adoption, and thus involve the use of two different rifles, the one in the Army, the other in the Navy. But when a metallic cartridge was definitely introduced for land service, it became evident, that if this could be used in a repeating rifle, there could be no valid objection to the latter being brought into use in the Navy, provided it was thought otherwise advantageous to do so.

The opinion being general that, for sea service at any rate, the many advantages of magazine weapons rendered them desirable, it only remained to see whether a suitable pattern would be found. For this purpose a Committee was formed, as we have seen, in the autumn of 1877 to make the necessary experiments. The principal points to which attention was to be directed were:—

1. To ascertain that the rifles submitted were in no way inferior in their ballistic qualities (flatness of trajectory and accuracy) to the Gras rifle, the weapon of the Army.

2. To determine what the practical rate of fire would be with each rifle in the hands of ordinary seamen and marines.

3. To make sure that the cartridges in the magazine were not liable to explosion, either by the shock of discharge, or during drill, or in case of the rifle being allowed to fall accidentally, and to note what influence, if any, the alteration in shape of the bullets in the magazine had on the shooting.

4. To test the construction of each rifle and see that they fulfilled the necessary requirements of solidity and safety, both with ball and blank cartridge, and that they were not liable to be rendered useless by rust or dust.

The Committee had further to state whether, in their opinion, the introduction of a magazine weapon was desirable for sea service, and if so, which of the arms offered for trial was best suited for the purpose.

Three different patterns of rifle were submitted, the Hotchkiss, the Krag, and the Petersen, and three specimens of each kind were tested. The Hotchkiss rifle is an American invention, manufactured by the Winchester Repeating Arms Company. In outward appearance it presents somewhat the appearance of the Chassepôt, being a bolt breech-loader. The magazine is placed in the butt and holds five cartridges. It can be used either as a magazine weapon or as an ordinary breech-loader, the supply from the magazine being cut off. When used as a repeater the bolt on withdrawal ejects the old cartridge case, at the same time a new cartridge is forced up from the magazine by a spiral spring. On pushing the bolt forward to close the breech, the cartridge is pressed by it into the breech and the rifle is then ready to fire. By a simple arrangement the action can be locked, so that it is impossible to fire the cartridge. To load the magazine the breech-bolt is drawn back and the cartridges pushed one after another through the bottom of the breech-shoe into the tube in the butt. They are prevented from issuing, except as desired, by a projection on the upper surface of the tube, which catches the base of the front cartridge in the magazine.

The Krag rifle is a block breech-loader. The block is worked by a hammer placed behind the block in a prolongation of its axis. The magazine is placed below the barrel, as in the well-known Winchester rifle, and it holds eight cartridges. The rifle can be used as a repeater, or, by shutting off the magazine, as an ordinary breech-loader. When used as a repeater, the breech is opened by pulling back the cock which depresses the block, ejects the old case and allows a fresh cartridge to come from the magazine on to the block. The latter is much more hollowed out than is the case in the Martini-Henry; towards the back part the sides are brought round so as to form two shoulders, beneath which the fresh cartridge glides when the breech is depressed, and which prevents it falling out or being ejected by the force of the magazine spring beyond the breech. The cock is then allowed to go forward till it reaches the position of full-cock, beyond which it was originally pulled. This allows the breech-block to rise a little till it is caught by the extractor, which is provided on either side with a slight projection for the purpose. The cartridge in the block must then be pushed forward with the thumb, in doing so the extractor is pushed back into its place and the block closes, thus shutting the breech. The rifle can be lowered to half-cock and the magazine may be cut off, by simply pulling a bolt worked by a projecting knob on the right side of the breech casing, up across the mouth of the magazine.

To charge the magazine the breech must be opened and the hammer held back by the thumb while the cartridges are pushed in one after the other.

The Kropatschek, which is the invention of an Austrian Officer of that name, is, so far as regards its breech mechanism, almost identical with the Gras rifle, and like it can be placed at half-cock. Its magazine is placed beneath the barrel and holds six cartridges. It can be used either as an ordinary breech-loader or as a magazine weapon.

When employed in the latter manner, the breech-bolt is withdrawn as usual, this ejects the old cartridge case and brings a fresh cartridge opposite the barrel, which is then pushed into place by the forward motion of the breech bolt in closing the breech. The cartridges pass from the magazine into the elevator, which is not unlike the breech-block of the Krag rifle, and is situated immediately beneath the breech-shoe. This works on a pivot which passes laterally through its rear end. When the breech is closed, supposing the arm to be used as a repeater, a cartridge is pushed forward by the magazine spring into the elevator. When the breech-bolt is pulled back it causes the elevator to revolve round its pivot and thus brings the cartridge into the right position to enter the breech as previously described. To load the magazine, open the breech and push cartridge after cartridge into the former till full, then place one in the elevator, making seven in all, and close the breech.

The following table gives the principal dimensions and weights of the rifles tried, which had all the same calibre and fired the same, viz., the French regulation cartridge, with a bullet weighing 386 grains, the powder charge being 81 grains :—

Dimensions and Weights.	Hotchkiss Rifle, Nos. 1, 2, 3.	Kropatschek Rifle.			Krag Rifle, Nos. 4, 5, 6.	Regulation French Army Rifle.
		No. 1.	No. 2.	No. 3.		
	ins.	ins.	ins.	ins.	ins.	ins.
Length over all	52·36	48·15	51·18	51·18	49·8	51
Length of barrel	32·28	29·25	32·28	32·28	32·28	32·28
	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs.	lbs ozs.
Weight of rifle without bayonet	10 5	10 2	10 9	10 3	9 6	9 4
" " " loaded and magazine charged	10 14	10 14	11 5	10 15	10 3½	9 5½
No. of cartridges that can be carried in the rifle	6—5 in the magazine, 1 in the barrel.	8—6 in the magazine 1 in the elevator 1 in the barrel			9—8 in the magazine, 1 in the barrel.	1 in the barrel.
	ins.	ins.	ins.	ins.	ins.	
Distance of centre of gravity from heel-plate: Magazine full	20·5	20	21·14	21·34	21·42	—
Magazine empty	21	19·7	21·34	21·14	21 1	ins. 21·5

The first experiments made were to ascertain that the rifles submitted for trial possessed the same accuracy as the regulation arm of the Army. Thirty rounds were fired from each of the rifles of the different makers, and from three Gras rifles, at ranges of 200, 400, 600, 800, and 1,000 metres. The result showed that they might be considered equal in accuracy among themselves, and with reference to the land-service rifle. The men who fired the rifles were chosen from the sailors and marines at Cherbourg, and were good shots. When used as ordinary breech-loaders, it was found that the Hotchkiss and Kropatschek rifles were quite as rapid in their fire as the Gras, but that the Krag was slightly inferior to the latter. Under the same conditions, it was not found that having the magazine charged made any practical difference in either of the rifles. If anything, the Krag and Kropatschek were fired rather more quickly, the Hotchkiss rather less so. This variation is doubtless to be attributed to the position of the magazine

which, being below the barrel in the two former, would assist the downward cant of the rifle when loading, whereas, in the latter, in which it is in the butt, the reverse would be the case.

In the course of the experiments to test the rapidity with which the magazines could be loaded, it was found that the absence of any means of preventing the return of the cartridges when pressed into that of the Kropatschek rifle was a serious defect. It lengthened considerably the time required to charge the magazine, as the man had constantly to press on the topmost cartridge while getting another to push down the tube. The rifle was therefore modified by the addition of a catch to obviate this fault, and the further experiments were conducted with the improved rifle, which henceforth will alone be spoken of.

To place five cartridges in the magazine and one in the breech of the Hotchkiss rifle took an average of 12·18 seconds. To place six in the tube, one in the elevator, and one in the barrel of the Kropatschek, took 18·75 seconds. To load the Krag rifle with eight cartridges in the magazine and one in the barrel, an average of 21·8 seconds was required. The rate per cartridge, it will be seen, is sensibly the same for the Krag and Kropatschek rifle, but to load the former is a more fatiguing operation, as the hammer which works the breech-block has to be held back during the whole time of loading, to keep the block sufficiently depressed to permit the cartridges being pushed into the tube. The Hotchkiss rifle can be loaded decidedly more quickly than the other two.

It was next sought to compare the rapidity of fire which could be obtained, when using the rifles as ordinary breech-loaders, with that which could be got when making use of their magazine arrangements. The result is shown in the following table :—

Rifle employed.	Time taken to fire all the cartridges in the magazines in seconds.	Number of cartridges which would be fired by a battalion of 1,000 men in that time.	
		Using their rifles as ordinary breech-loaders.	Using their rifles as repeaters.
Hotchkiss.....	14·35	3,011	6,000
Kropatschek.....	16·84	3,590	7,000
Krag[1].....	31·71	6,194	9,000

From which we derive the fact that if V be rate at which the rifle can be fired, using the magazine, and v that obtained when it is used as an ordinary breech-loader, then—

$V = 1{\cdot}88v$ in the case of the Hotchkiss.
$V = 1{\cdot}88v$ „ „ Kropatschek.
$V = 1{\cdot}23v$ „ „ Krag.

[1] The Krag rifle worked rather irregularly during this trial. When in good order a somewhat less time was taken to fire the cartridges.

Thus, suppose a body of men, say, a company 250 strong, to be armed with the Kropatschek, and another body of the same strength with the Gras, it will be found that, in 17·3 seconds, the time taken to empty the former rifle, the men equipped with it would have fired 2,000 rounds, while those using the latter would only have fired 1,125. "At "a given moment," says the report, "such a difference might have "a decisive effect." This shows also how great the advantage is of having a large magazine, which was the more strongly brought out by the following experiment.

The three rifles were fired during the time which it took to empty the magazine of that which contained the greatest number of cartridges, *i.e.*, the Krag. The time taken in this case was 25 seconds, as the Krag rifle, which had hitherto been working irregularly, now worked without any hitch. When the magazines of the Hotchkiss and Kropatschek rifles were emptied, the fire from them was continued as from an ordinary breech-loader. Before the fire was commenced, the magazine was cut off, as would be the case under ordinary circumstances in the field. When the word of command was given, therefore, to commence fire, they had to be opened. In these circumstances it was found that a company of 250 men would fire in 25 seconds—

From the Hotchkiss rifle.....	1,975	rounds.
„ Kropatschek rifle	2,225	„
„ Krag rifle.....	2,250	„

If the rifles were used as ordinary breech-loaders only, then in the same time would be fired—

From the Hotchkiss rifle.....	1,309	rounds.
„ Kropatschek rifle	1,330	„
„ Krag rifle.....	1,218	„

So that we have, by using the magazine, a gain in the case of the—

Hotchkiss rifle	666	rounds.
Kropatschek rifle.....	872	„
Krag rifle.....	1,832	„

As to the absolute rate of fire, the following table shows the mean rate per cartridge, and the mean time required to empty the whole magazine of each rifle :—

Rifle employed.	No. of cartridges which can be placed in it.	Mean time taken in seconds.	
		To empty the whole magazine.	To fire one round.
Hotchkiss.....	6	14·4	2·4
Kropatschek	8	19·2	2·4
Krag.....	9	24	2·66

As the result of the experiments we have described, the Committee concluded—

1. The magazine of the Hotchkiss rifle is the most easily and rapidly charged, that of the Krag the least so;

2. Comparing the rapidity of fire of the three types, when used as magazine rifles, with that obtained when used as ordinary breech-loaders, the ratio with the Hotchkiss and Kropatschek is as 2 to 1, with the Krag as 3 to 2;

3. The rapidity of fire, using the magazine, is about equal in the Kropatschek and Hotchkiss rifles, and both are more rapid than the Krag;

4. Other things being equal, that rifle is the best which contains the largest number of cartridges;

5. Once the magazine is empty, it is better from the point of view of rapidity of fire to use the rifle as an ordinary breech-loader than to re-charge the magazine;

6. The time taken to bring the magazine into play, when the rifle has previously been in use as an ordinary breech-loader, is unappreciable.

The next step that was to be taken was to ascertain that neither the shock of discharge nor the blows which the rifles might receive in the course either of drill or accidental falls, would cause the premature explosion of the cartridges in the magazine, and further, to find out whether any alteration in the shape of the bullets, which might arise in the magazine from any of the above causes, affected the shooting.

For the better carrying out of the necessary experiments, special cartridges were fabricated. Some were made with the safety cap, which, in the French cartridges, covers the percussion cap only one-half, others only one-third the usual thickness, so as to be extra sensitive, and these cartridges were filled with charcoal instead of gunpowder, to prevent accidents.

Each rifle had its magazine filled with cartridges, and then had 100 rounds fired from it, as an ordinary breech-loader, as quickly as possible. This was done three times, the first time ordinary cartridges were placed in the magazine, the second, those with safety caps reduced to one-half, and the third time, those having the safety cap only one-third of the usual thickness. No explosion took place, and on a subsequent examination it was found that, in no instance, had the fulminate been disturbed or damaged.

The magazines then being filled with regulation cartridges, 150 rounds were fired from each rifle, as an ordinary breech-loader, in two series of 100 and 50 rounds, and afterwards the magazine cartridges were fired off as quickly as possible. Next, the magazines were only partially filled and 100 rounds fired from each rifle, as above. In neither case did any accident occur, and it was evident that the cartridges in the magazine were quite secure.

The rifles were next tested to ascertain whether the shocks incident on drill or accident were liable to explode the cartridges in the magazines. Each rifle, after being charged with regulation cartridges, was subjected to the various drills, &c., to which it would be liable under ordinary circumstances, during a period of eight days, without any

accident occurring. After that the ordinary cartridges being replaced by the most sensitive ones before described, the rifles were allowed to fall from a height of five feet on to a hard stone pavement, sometimes on the butt, sometimes on the muzzle, and often the same set of cartridges was twice allowed to fall. In no case was it found that the fulminate was in the least disturbed. It was also found by experiment that not even the firing of the most defective cartridges affected those in the magazine.

With regard to the deformation of the bullets in the cartridges in the magazines under the various conditions of drill and firing, it was found that they were liable to it; but that although the alteration in form was in some cases considerable, it did not practically affect the shooting up to 450 yards, the limit of range for the use of the repeating arrangement, nor did it affect the working of the arm in so far as the Kropatschek or Hotchkiss rifles were concerned.[1] On the contrary, however, with the Krag, considerable difficulty was occasionally experienced in pushing the cartridge home.

The Committee concluded therefore that the cartridges might be kept in the magazines both during firing and drill without danger, and that they were not liable to explosion from any fall to which the rifle would ordinarily be exposed.

The next step was to see what influence the firing of defective cartridges would have on the mechanism of three different arms and on the cartridges in the magazine.

So long as the defect was in the body of the cartridge, it was found that practically it did not affect the rifle, nor were the escapes of gas so caused appreciable, and in no case were the cartridges exploded. A cartridge with a defective base, however, which was fired from a Hotchkiss rifle, damaged the breech arrangement very considerably, whereas neither the Kropatschek nor Krag rifles, the latter particularly, were affected under similar conditions.

It is difficult to judge, from the description at our disposal, the real reason for this difference in action between the Kropatschek and Hotchkiss rifles. Both are bolt breech-loaders, and there would seem no *primâ facie* reason why one should resist such a test better than the other. It would seem probable, therefore, that the true reason is to be found in the cartridges employed. The necessary cracks were made by filing, and it is perfectly possible that in the case of the cartridges employed in the Hotchkiss rifles, the fissures were larger than those used in the Kropatschek. It is natural to find the greatest resisting power in the Krag rifle, as in that the breech is closed by a falling block, the superiority of which, in such cases, has long been proved in England.

The rifles were next subjected to the exposure test. After having fired the defective cartridges the rifles were not cleaned for five days, and during the first three of these, 100 rounds were fired from each daily. When not in use they were left exposed to the weather and,

[1] The French bullet is made of pure lead compressed. If a hardened bullet were employed these deformations would not arise, or would, at any rate, be considerably less.

as there was no rain, were watered from time to time. At the end of the third day they could still be worked, but the movement had become difficult. The rifles were then taken on board the "Colbert," to expose them to the influence of the sea air. By mischance they were so placed as to receive the water dropping from the hammocks. At the end of the fifth day not one of the rifles was in working order. In the Kropatschek and Hotchkiss rifles it was exceedingly difficult to draw back the breech-bolt, and in the Krag it was extremely hard to push in the cartridge, owing to the extractor being fixed by the rust. The wooden piston-heads in the magazines of the two first-mentioned arms had become too swollen to work, but in the last-named the breech mechanism was not affected. Nevertheless no permanent injury was done to either of the three types of rifles which could not be set right by a good cleaning.

To ascertain whether the arms were affected by dust, each after firing ten rounds was exposed during four hours to a stream of fine dust, the magazines being empty and the breeches closed. After a slight cleaning with the hand ten rounds were fired from each, using the repeating arrangements, and in no case was the slightest difficulty in working discovered.

The Committee therefore concluded that—

1. Defects on the base of the cartridge are dangerous in the Hotchkiss, but present no particular inconvenience in the Kropatschek, and are harmless in the Krag rifle.

2. The Kropatschek best withstood the exposure test, but requires a metallic piston instead of a wooden one in the magazine to insure its action under all circumstances.

3. So long as the breech is closed, not one of the three is affected by dust.

Finally, it was necessary to consider the mechanism of each of the different rifles as a whole, and with reference to their capabilities of withstanding the requirements of service.

Dealing first with the Hotchkiss, this rifle was found to possess the following advantages :—Simplicity and ingenuity of construction, combined with easy manipulation and great facility in charging the magazine. On the other hand, in addition to some minor deficiencies, difficulty was sometimes found in pushing forward the cartridge into the breech when using the rifle as a repeater, and if the mechanism of the magazine got out of order it completely stopped the working of the rifle. Moreover, the rifle holds only five cartridges in its magazine and one in the breech, besides which its weight, 10 lbs. 5 ozs., is somewhat excessive.

With regard to the Kropatschek the mechanism of the breech is the same, and therefore possesses the same advantages and defects as the Gras rifle. The magazine arrangements work perfectly, and the rifle is also well adapted for use as an ordinary breech-loader. It has the advantage of holding eight cartridges. Its chief defects lie in the somewhat delicate arrangements of the elevator, in the fact that the magazine is fixed to the barrel, and must be removed with it, and in its weight, 10 lbs. 2 ozs., or 14 ozs. more than the Gras rifle.

Royal United Service Institution.

MEMORANDUM FOR 1879.

The Council having decided that a Gold Medal be granted annually for the best Essay on a Naval or a Military subject, make known the conditions of competition:—

(1) The Candidates must be members of the Institution, or persons eligible to become Members, according to the following Extract from the Bye-laws, Section II., paragraphs 1 and 2, viz.:—

1. "Princes of the Royal Blood; Lords Lieutenant of Counties; Governors of Colonies and Dependencies; Officers of the Army, Navy, Marines, Her Majesty's East Indian Military and Naval Forces, Militia, Yeomanry, Royal Naval Reserve, and Volunteer Corps, shall be entitled to become members *without Ballot*.

2. "Ex-Governors of Colonies and Dependencies; Retired Officers; Deputy Lieutenants of Counties; Civil Functionaries who are or have been attached to the Naval and Military Departments; the Master, Deputy-Master, and elder Brethren of the Trinity House; and Army and Navy Agents; shall be *eligible* to become Members by *Ballot*."

(2) The subject for this year shall be of a Naval character.

(3) The Essays must not exceed 64 printed pages of the size and style of the "Journal."

(4) The Essays must be forwarded to the Secretary, on or before the 1ST NOVEMBER, 1879, except in the case of those forwarded from India, China, and the Pacific, which will be received to the 1ST DECEMBER.

(5) The Essays must be strictly anonymous, but each to have a Motto, and to be accompanied by a sealed envelope with the Motto written on the outside, and the name of the Candidate inside.

(6) The Essays will be submitted for decision to three Referees chosen by the Council; but no award will be made by them in favour of any Essay which does not, in their opinion, attain a sufficient standard of excellence.

(7) The award of the Referees will be made known, and the Medal will be presented to the successful Candidate (or his representative) at the Anniversary Meeting, and his Essay will be printed in the "Journal."

The following is the subject for the Essay for the present year:—

"Naval Tactics on the open Sea, with the existing types of Vessels and Weapons."

By Order,

B. BURGESS, CAPTAIN,
Secretary.

WHITEHALL YARD, LONDON,
1*st January*, 1879.

On the whole, the Krag rifle showed itself inferior to the other two, although possessing some points in its favour; but it does not appear suited to so long a cartridge as that employed in the land service French rifle. Moreover, it had the great disadvantage of requiring each cartridge to be pushed into the breech by the hand. It must, however, be admitted that the breech mechanism is simple and strong, that the rifle, while weighing no more than the Gras, holds nine cartridges.

Finally, the Committee had to determine whether a magazine rifle was suited for the Navy, and if so, which of the types submitted was the best to adopt.

On this first point their reply was a unanimous affirmative. They point out that for use in the tops, on the quarter-deck, or forecastle, repeating rifles possess undoubted advantages, as enabling a small number of men to pour in a powerful fire. For similar reasons their employment is advantageous in the case of the guard on board a ship at anchor and for the crews of the guard boats rowing round it. Again, the numerical inferiority of a prize crew, or of any detachment which might be landed to hold an important point, points to the desirability of giving the men the most powerful armament procurable.

With regard to which of the three types submitted was the best for adoption, the Committee considered that on the whole the Kropatschek was the best adapted for use in the French Navy. The Krag was unsuited because, as we have seen, it did not seem feasible to employ a long cartridge with it, and because it was somewhat slower in its action than the other arms. The Hotchkiss was in many ways superior to the Kropatschek, especially in point of simplicity, and the smaller number of pieces involved in its construction. On the other hand, the magazine in the butt being short, necessarily contains fewer cartridges than when it is placed below the barrel; and it was found that if the magazine mechanism were impeded, the arm could not be used even as an ordinary breech-loader, a fault from which its rival was entirely free.

The Kropatschek, although more complicated and possessing in the elevator, with the spring cartridge check of the magazine, a rather delicate mechanical arrangement, had worked perfectly during the trials. It possessed, moreover, the advantages of being similar in its manipulation and breech apparatus to the Gras rifle, and could be made to hold nine cartridges, viz., seven in the magazine, one in the elevator, and one in the barrel. In their report, therefore, dated 29th March, 1878, the Committee proposed the introduction of the Kropatschek rifle holding nine cartridges as above, and on the 28th June their recommendation was approved by the Minister of Marine and henceforth the French Navy will be armed with a repeating rifle.

The trials made were exhaustive, for each rifle had fired 10,000 rounds of blank and about 2,000 rounds of ball cartridge, and on the whole there is no objection to be made to the opinion expressed by the Committee. There can be no doubt that in many ways the Kropatschek was the best of the three rifles submitted to them. The Krag is undoubtedly the least efficient, and the soundness of its rejection is

undeniable. On the other hand, it must be remembered that both of the others as tried were much heavier than in English opinion a rifle should be. The Martini-Henry weighs only 8½ lbs., the Hotchkiss and Kropatshek about 10 lbs. 5 ozs. each. Now, if the last two rifles had their weight brought down to a reasonable amount, say 9 lbs. 4 ozs., the weight of the Gras, it would be found that with the magazines fully charged, the Hotchkiss rifle would be much better balanced than the Kropatschek, no unimportant advantage so far as accurate shooting is concerned. Since the trials in France the former arm had been considerably improved and still more simplified, the defects which then became evident having been entirely removed. The sole disadvantage remaining, is the smaller number of cartridges that can be placed in the magazine, and it would be a question, therefore, whether this alone would render nugatory its otherwise undoubted superiority. In the eyes of the United States Army this is not the case, for they propose to introduce the Hotchkiss rifle, and personally we believe that they are right in their determination.

The repeating rifle in use in the Norwegian Navy is the Krag-Petersen, and is substantially the same as the Krag rifle, already described, so far as its mechanism is concerned, and is distinguished from it only by its superior calibre, viz., ·539 inches. The rifle weighs 9 lbs. 7 ozs., and is 4 ft. 3 ins. long. The cartridge is a rim-fire, and contains a ball weighing 366 grains with a powder charge of 66 grains. This rifle cannot be considered as at all up to the requirements of a modern weapon. The calibre is too large, the bullet light, and the powder charge small. Its sole redeeming feature lies in its magazine arrangement. It contains nine cartridges which, with one in the barrel, make ten as total number of rounds which can be fired without loading the arm. Judging from an account of some comparative experiments which took place in Sweden, it is neither so accurate nor so rapid as the Mauser rifle. Thus in firing at a target 6 feet high by 4 feet wide from a distance of 500 paces, the German rifle fired 10 rounds in one minute, hitting each time; whereas the Norwegian rifle, firing 10 rounds in 55 seconds, made only 9 hits. In a trial for rapidity at a moving mark the Mauser fired 10 rounds in 45 seconds, hitting 4 times; the Krag-Petersen required 50 seconds to fire the same number, and struck the target only twice. These results are not as good as were obtained by the French Committee (see *ante*, page 1094); but it would seem that, at any rate, the Krag-Petersen is not entitled to rank very high among modern small arms.

The Kropatschek has, as we have already said, been tried in Austria. Experiments which have lately been made, go to show that it is a superior weapon to the Werndl rifle hitherto in use in that country, and that, even when used as an ordinary breech-loader, it is more rapid in its action. At present, however, it is not likely to be introduced into the service. The War Minister proposes now to improve the Werndl by enlarging its chamber, so as to take a larger cartridge, and it is improbable, therefore, whatever its advantages, that the Kropatschek will be adopted in its place.

The Winchester rifle used by the Turkish cavalry may be seen in the

museum of the Institution. It weighs 8 lbs. 8 ozs. and is 3 ft. 10 ins. long. It can be used either as a repeater or as an ordinary breech-loader. The magazine is placed below the barrel, and holds sixteen cartridges. The bullet weighs 200 grains and the powder charge is 40 grains. The disadvantages of this weapon are its great complexity and its small cartridge. This latter fault has been remedied in the latest pattern brought out by the Winchester Repeating Arms Company, but the former still exists. It must, however, be admitted that it did good service during the late war. It can be used as an ordinary breech-loader or as a repeater at will. To open the breech, the trigger-guard is pressed forward, as in the Martini-Henry, by which means the hammer is brought to full-cock, the old cartridge-case rejected and a fresh cartridge brought up by the elevator into position opposite the rear end of the barrel. When the trigger-guard is brought back, this is pushed into the breech and the weapon is ready to fire. An opening is made in the right side of the stock below the breech-bolt, through which the cartridges can be introduced into the magazine.

The Fruwirth rifle, with which the Austrian gendarmerie and Tyrolean mounted rifles are armed, is very similar in its mechanism and action to the Kropatschek, which latter may indeed be considered an improvement on it. It measures 3 ft. $4\frac{3}{4}$ ins. and weighs 8 lbs. 1 oz., fires a cartridge having a bullet weighing 313 grains with a powder charge of 33 grains. Eight cartridges are carried in the arm, viz., six in the magazine, one in the elevator, and one in the barrel. The magazine is charged in the manner described for the Kropatschek rifle, and it is said that it can be done in twelve seconds. The eight rounds can be discharged in sixteen seconds. This rifle even according to Austrian accounts is not a first class weapon. It is complicated, fires too small a cartridge, and is difficult to work as an ordinary breech-loader.

The Swiss Vetterli repeating rifle is interesting as forming the weapon of the only infantry which is armed completely with a magazine arm. It is in outward appearance much like the Kropatschek or Hotchkiss rifles, except that the breech-handle is placed further back. It is 4 ft. $6\frac{1}{2}$ ins. long, weighs 10 lbs. 8 ozs., fires a rim-fire cartridge, with a bullet weighing 310 grains and a powder charge of 55 grains. It can be used either as an ordinary breech-loader or as a repeater. The magazine, which is placed below the barrel and holds eleven cartridges, is loaded from the right side of the breech, as in the Winchester repeater. The chief advantage of this rifle lies in the large number of cartridges it contains, viz., thirteen altogether. Its initial velocity is 1,427 feet, so that for short distances its trajectory is flat. Beyond close ranges, however, its light bullet rapidly loses velocity, and its accuracy, therefore, cannot be very great. It is, moreover, extremely complicated in its mechanism, and altogether, although a great advance at the time it was introduced, is now fallen into the second rank of weapons.

From the foregoing pages we think it will be seen that of all the types described, the Hotchkiss and the Kropatschek are by far the best, and that by the introduction of the latter into the French Navy, an

armament has been obtained which is in all points equal, and in many superior to, that of any other nation.

NOTICES OF BOOKS.

Histoire de la Guerre de Crimée. Par Camille Rousset, de l'Académie Française. Paris: Hachette et Cie., 1877. 2 vols. and Atlas. Price 22fr. 50c. Size, bound and complete, 9′ × 6′ × 3″. Pp. 934.

THE work now before us is dedicated to General Trochu, who went out to the East in the spring of 1854 as first aide-de-camp to Marshal St. Arnaud, and was kept on the head-quarter staff by that Officer's successors, only quitting it in June, 1855, to take command of a brigade, which he led to the final assault on the 8th September, when he fell severely wounded at the foot of the "Central Bastion." General Trochu, since become a historical character, enjoyed the entire confidence of the three Generals who in succession commanded the French Army in the East, and was thus completely behind the scenes. His name, therefore, gives of itself a certain stamp of authority to M. Rousset's work. The author was engaged in historical researches at the French War Office during the years 1854–55. He could not fail to be deeply impressed by the feelings of those around him, whose minds were fully occupied with the great drama which was being played out on the shores of the Black Sea; he then and there, as he tells us, resolved to write the history of the Crimean War, a resolution confirmed by subsequent conversations with his friend General Trochu, after the latter returned from the seat of war. He had, as the contents of his work show, access to the official documents and to the correspondence, both official and confidential, which passed between the Emperor of the French and his Minister of War on one side, and the French Commander-in-Chief and other Officers at the seat of war on the other.

Whether these documents, which give a special value to his work, were communicated to him by General Trochu, or whether he met with them at the War Office, we know not; but of this we have no doubt, that M. Rousset's work would never have appeared had the Empire lasted, containing as it does matter, the publication of which would have been extremely distasteful to the Imperial Government. To this, probably, more than to any other cause is due the delay in bringing out the work, a delay not to be regretted, as it has enabled the author to sift his materials with greater care, and perhaps also has allowed any undue heat of feeling which might have been betrayed at an earlier period to evaporate.

The result of the author's labours is one of the most important contributions towards a history of the Crimean War which has yet appeared; indeed, setting aside the technical accounts of the siege of Sevastopol which have been published by the War Departments of England, France, and Russia, and which are, as far as they go, exhaustive, we think the most important of all, its special value consisting not only in the revelations to which we have before alluded, but in the almost total absence of prejudice, either national or individual, shown by the author, whose work in that respect shines out in happy contrast with that of one of our own countrymen, to which he alludes more in sorrow than in anger. M. Rousset is clearly no admirer either of the Emperor Napoleon or of his system, but he never speaks of either in an unbecoming manner; he is evidently a thorough Frenchman, fully appreciating the prowess and other good qualities of his countrymen; still he does not spare them when he thinks they are to blame, and whilst he does them full justice he is rarely, and we are convinced never wittingly, unjust either to their allies or to their enemies.

In short, there is a total absence of what our neighbours call "*chauvinism*," and what we shall probably in future call "Jingoism," rarely to be remarked in the chronicles of war, especially when written by the author's countrymen. In addition to the merits of calmness and impartiality, M. Rousset has that of a clear and vigorous style, and though he is fortunately not given to fine writing, his narrative becomes on occasion animated, picturesque, and graphic. His work contains but few purely technical details, and is on that account all the more likely to be acceptable to the general reader; whilst the light which it throws on certain dark phases of the war, and on the relations between the allies, recommend it to the military student. It is accompanied by a small atlas containing very fair maps and plans.

Valuable as this work is, however, it is far from being a complete picture of the Crimean War; it is only a good sketch taken by a clear-sighted, honest, and impartial observer from one point of view. A complete history of this great contest has not yet been published, and probably it will not fall to the lot of the present generation to read one; but the time will come when the whole truth may be told without offence to nations or individuals. Then the history of the Crimean War will at last be written, and works such as that now before us will be of great value to the future historian. Meanwhile, though we do not find all we want in M. Rousset's pages, we find much that is new and suggestive.

The author brings vividly before us the dangers and difficulties arising from divided command—dangers and difficulties to a great extent inevitable when the armies of two great nations fight side by side against a common foe, and in the present case greatly increased by the constant interference of the French Emperor—a would-be strategist, who was from the first too much inclined to meddle with the conduct of the campaign, and who when dissuaded later on from putting himself at the head of his Army in the Crimea attempted to direct its movements from Paris, the electric telegraph, then a novelty in war, giving him dangerous facilities for the purpose. Had it not been for the stubborn and courageous opposition of General Pélissier, supported by the tact and good feeling of Marshal Vaillant, the Emperor would have probably saved Sevastopol for the Czar, and have broken up the Anglo-French alliance. We all knew long ago that the two great Powers which headed the alliance against Russia did not always pull together as well as could be wished, but few, we think, were aware before the publication of M. Rousset's work how often the alliance was in jeopardy, how near it was to total wreck at the beginning of July, 1855, and how much both France and England owe to the French Commander-in-Chief and to the French Minister of War.

Sometimes the Emperor's meddling activity took a turn which was more ludicrous than dangerous. For instance, Marshal Vaillant wrote on the 3rd February, 1855, to General Canrobert, then commanding:—"The Emperor orders me to send you "4,000 cuirass fronts made so as to cover and protect the chests of our infantry "soldiers when mounting to the assault." The Czar was early informed of this brilliant conception of his Imperial cousin, and mentioned it in rather a sarcastic manner in a letter to Prince Menchikoff, dated February 12th, 1855. The 4,000 steel corslets arrived in the Crimea and were issued to the two French Army Corps, but were never used; and, as M. Rousset says with sly humour, "*L'on fut généralement d'avis de garder sur ce sujet délicat un silence prudent.*"

Napoleon's mind was evidently at that time much occupied with cuirasses,—which he was more successful in applying to naval than to military purposes, witness Kinburn.

Napoleon was one of the not uncommon class of despots who could not confide in the General of his selection. On two occasions he sent out Officers to the Crimea on a confidential mission to report upon the conduct of the campaign, with which he was not satisfied. These Officers, of course, corresponded directly with him and with the Minister of War; and what is more surprising, other Officers of the Crimean Army appear to have been encouraged to criticize the actions and conduct of their superiors, including the Commander-in-Chief, and to communicate their opinions privately to the authorities at Paris. Hence arose a system of backbiting and intrigue, which must have been very damaging to discipline and very demoralizing to the Army.

The more we read and reflect about the Crimean War, the more we are impressed

by the difficulties which caused the great triumph to be so long delayed (difficulties partly inherent in the undertaking, partly caused by want of preparation and bad management), and the more thankful we are that the allies got so well out of it.

We will give two more extracts selected from many passages of a similar nature to show how well inclined M. Rousset is to do justice to the British Army, whose shortcomings in the campaign he however also points out. After describing the failure of the French artillery in the first bombardment, on 17th October, 1854, and the gallant, steady, and successful efforts of the British gunners, he says, "Thus the "English artillery had gained at this point a brilliant success, and we may say that "it only rested with Lord Raglan to convert that success into decisive victory. The "great Redan was for several hours on that day indefensible and at his mercy. . . " . . . The English Army has reason to remember with pride many a deed of "valour and many a day honourable to its annals during the siege of Sevastopol; "but once only, and that on the 17th October, it was upon the point of gaining a "triumph unshared by its allies."

Again, towards the end of his work, M. Rousset quotes the following remarks of "*un bon observateur*" who was present at a review of the English Army in the Crimea in February, 1856, when about 50,000 men were under arms, the largest force of native British troops which ever mustered in the field.

. . . . "England has proved that it could raise, instruct, and discipline in "less than a year an Army of 50,000 men almost equal to the best troops in the "world. If the war is renewed they will make up brilliantly for their want of "success in the final assault on Sevastopol, for their superiority over what they "were at that time is immense, both in respect of numbers and on account of their "eagerness to measure themselves with the Russians. They have made wonderful "progress;" M. Rousset adds, "as for the Navy, England had only herself to "surpass, and she has done so."—L. G.

Rapport sur l'Armée Allemande, addressé à S.A.I. Le Grand-Duc Nicolas. Par le Colonel Baron Kaulbars, de l'Etat-Major Russe, au retour de sa Mission Militaire à Berlin (1875–76). Traduit du Russe avec l'Autorization de l'Auteur. Par G. Le Marchand, Capitaine au 15e d'Artillerie. 1 vol. Paris: Librairie Militaire de Berger-Levrault et Cie. Paris, 1878. Price 6 francs. Size $7\frac{1}{2}'' \times 5'' \times 1\frac{3}{4}''$. Pp. 677. Weight 1 lb. 10 ozs.

To any one who wishes to get behind the scenes and to learn the inner working of the German military system, we cordially recommend this book. Colonel Kaulbars is an enthusiastic soldier, and has hit off those points which will be of most value and of deepest interest to his professional readers. He paints in great detail, but in a pleasant and readable style, the inner lives of Officers, non-commissioned officers and soldiers, and brings most vividly before the eye the training which has made the German Army what it is. Possibly the Colonel is an optimist, and has passed over in judicious silence the less pleasant features of a German soldier's career; but making allowance for exaggeration, the book bears the impress of truth. The writer of this notice recently had an opportunity at Metz of testing some of Colonel Kaulbars' statements, and the result was most satisfactory. No point does the Colonel bring out into stronger relief than the independence and the responsibility enjoyed by the company and squadron leaders, and the absence of meddling centralization. The writer cannot refrain from relating as a striking illustration of this characteristic in the German Service, and in confirmation of the view of it taken by Colonel Kaulbars, an incident which came under his personal observation. In July last a brigade of cavalry was being exercised in swimming the Moselle. One of the troop horses was drowned and floated away down the stream. Nobody appeared particularly excited about the matter. In answer to a question, one of the Officers remarked that probably the saddle and equipment would be recovered, but it was not an incident calling for special notice. Enquiries were then made as to the course which would be pursued with regard to this accident; how many boards of inquiry would be convened for the purpose of investigating, &c. (it must be remembered that the questioners were English Officers). The answer may be thus epitomised, and we give

it without comment. "Boards of Inquiry? None. The squadron leader will return "the horse 'drowned at swimming exercise.' That is all. If nineteen horses had been "drowned, and the return had shown this number of casualties, the query would "have come down from the authorities, *were proper precautions taken to prevent "accidents?*" As Colonel Kaulbars points out, the efficiency of the squadron is a matter which depends on the squadron commander, and not until the regular period arrives for testing the efficiency will any interference with the commander be tolerated. It is much to be regretted that owing to the limited demand for military literature in this country it is not likely that the report will be translated into English; but appearing in a French dress, and issued at an extraordinarily low price, it will, it is to be hoped, find many readers in this country.—L. A. H.

Notes on Individual Equipment for the East. From Personal Experiences. By Captain T. Fraser, R.E. Mitchell. London, 1878. Price 6*d*. Pamphlet. Pp. 19.

PREFACE. "The following notes on equipment have been put down on the chance "of their being of use to others. They are based on the experience of many months "lately spent in European and Asiatic Turkey during summer and winter.

"To the notes has been added a list of what has been found useful, and to save "inquiries, and also the time of those who may have to get their kit in haste, other "particulars have been given where it appeared desirable."

La Fortification du Champ de Bataille. Par le Général A. Brialmont, Inspecteur-Général des Fortifications et du Corps du Génie de Belgique, avec un Atlas de dix-neuf Planches. 1 vol. Bruxelles: Librairie Militaire C. Murquardt. 1878. Price 13½ francs. Size 9″ × 6″ × 1⅞″. Pp. 415. Weight under 2½ lbs.

THE author tells us that this work is a complete treatise, which will not require modification for a long time, because he has taken into account both the experiences derived from the last wars and also the recent treatment of the question of field engineering in the schools of Germany, France, Austria, and Belgium.

General Brialmont stands among the first engineers in Europe as an authority on Permanent Fortification, but when he writes on Field Fortification he has to submit to those conditions which render the satisfactory treatment of the subject as impossible to him as it is to the many other military men who have essayed the task; viz., the transitional state not only of tactics but of armament, and its most advantageous employment. It is, therefore, no act of presumption on our part, if, whilst recommending this book as a valuable contribution to military literature, we add the caution that the conclusions contained in it should be carefully weighed and considered before they are accepted.

General Brialmont himself seems to feel the unstable nature of the foundations on which he has constructed his edifice, for, when comparing the heroic defence of Plevna with the feeble resistance offered at Kars, he recalls the old adage and admits its truth, "*Tant vaut l'homme tant vaut la place*," (p. 356); and, dealing with the same topic, he writes, at p. 352, "This proves that identical results can "be obtained by the employment of different means when these means are justified "by a judicious appreciation of the physical and moral conditions of the opposing "forces and their Generals; a fresh confirmation of the truth that war is not an "*exact science* but an *art*, which requires for its exercise a natural aptitude which "work renders fruitful and experience ripens."

The keystone of defensive warfare of the future lies, according to General Brialmont, in the free use of closed works, of which he gives three types; the first garrisoned by a company of infantry, 200 strong, the second by two companies and a battery of artillery, the third by a battalion. The only cases in which artillery should not be placed in redoubts, are those where very good (*très bons*) positions for batteries are found in their neighbourhood (p. 351). The General does not, however, intend that these guns should take part in the earlier stages of

the combat, but he would reserve their fire until the struggle comes to close quarters. In the defence of localities the same predilection for redoubts recurs.

The book will doubtless be extensively studied; but not a few points in it will meet with criticism, such, for instance, as the proposal to place batteries in tiers, p. 164; the allotment of six to eight men per metre in an average position, p. 178; the maintenance of the idea of shock tactics, p. 179; and, lastly, the very extensive use of destroying houses by demolition or burning, recommended in the defence of localities.

The notes on the late campaign, with the plans of the works constructed during it, will be found very interesting. L. A. H.

The Operations of War. Explained and illustrated by Edmund Bruce Hamley, Major-General, late Commandant of the Staff College. Fourth Edition. 1 vol. Blackwood and Sons. Edinburgh and London, 1878. Price 30*s.*[1] Size 10″ × 8″ × 2″. Pp. 491. Weight under 4½ lbs.

THE fourth edition of this work shows that General Hamley does not intend to allow it to become antiquated or behind the times. There are certain portions of the work which, from their standard character, might almost be stereotyped, such as those which describe the strategy of campaigns, but even here the hand of the careful reviser is apparent.

There is, however, one matter prominently brought forward in this edition, and on which it seems desirable to offer some remarks. We refer to General Hamley's comments on the conduct of Bazaine on the 17th August, the day after the Battle of Vionville, and on the line of action which he considers open to the Marshal. General Hamley suggested in the third edition of his great work, that Marshal Bazaine might, on the 18th August, have broken out of Metz in a south-easterly direction on the right bank of the Moselle, across the German communications; and he further said—"That the 17th was a day on which the French were "absolutely free to execute their designs without molestation, is shown by the fact "that on the 18th the German Second Army advanced for hours in a wrong "direction before discovering the French position."

This view of the question was at once combated by Colonel Sir Lumley Graham, in a letter which appeared in *The Army and Navy Gazette* of the 22nd March, 1873, and an interesting correspondence between Colonel Graham and Colonel Hamley resulted. Sir Lumley's arguments do not appear to have carried any weight with his opponent, for in the present edition we find the theory again brought forward in its integrity. Although we have, after most carefully investigating the situation by the light of official and other documents, formed a very strong opinion adverse to the practicability of the proposed movement, and also to the correctness of some of the premises on which General Hamley founds his arguments, we willingly allow that it is a case about which independent investigators may arrive at different conclusions: but we cannot pass over, without comment, the fresh note at p. 332, in which the views of the Germans themselves are brought forward as incidentally supporting General Hamley's theory.

There is also, we know, a widely-spread notion that the theory in question is supported by the published views of the German General Staff. Our chief object in offering for consideration the following remarks is to show that this idea is a delusion; that General Hamley's theory, be it right or wrong, derives no support from the German Staff critics, who in the passage referred to by General Hamley are considering a totally different military situation.

The Germans admit, in fact (p. 533, vol. i, Clarke's "Translation of the Official "Account of the War"), that on the 31st August, the day of Noisseville, Bazaine could "in view of the position at that time of the Investing Army," have broken out in a south-easterly direction.

General Hamley writes:—"If the chances in favour of Bazaine's supposed

[1] It should be mentioned that the book can be obtained at the Army and Navy Co-operative Stores for 22*s.* 6*d.*

"attempt were at that time so great, how much greater would they have been on "the 17th (*sic*), when the Germans were scattered and unprepared for resistance "on that side! In other respects, the above description of the operation in the "German official account is a curiously exact abstract of that proposed in detail in "the text." The 17th is here given as the day for the attempt, whereas in the text this day is consumed in bringing back the French Army across the Moselle, and the 18th is the day named for the sortie. It is evident that the latter is the day intended.

Leaving out of consideration the facts that the 17th was a bright and clear day, and that during the afternoon the artillery of the 1st Corps were firing into Metz from the south-east, and, therefore, that in all probability the movements of the French would have been seen and their intentions discovered; we would ask any one interested in the question, to place on the map the German troops, first in the positions they occupied at 3.30 A.M. on the 18th (the hour and day fixed by General Hamley for the commencement of the movement); and second, in the positions they occupied on the 31st, and then let him draw his own conclusions as to the correctness of the inference in the note.

At pp. 4 and 5 of vol. ii of the "Translation of the German Official Account of "the War," will be found the positions of the troops on the right bank, and in the note on p. 6, the positions of those on the left bank of the Moselle at 3 A.M. on the 18th. The positions of these same troops on the 31st, minus the Guards and the Saxons and four Cavalry Divisions, who had gone to the west, will be found at pp. 473, 485, 486, 487, 493, and 494 of the first volume, and on the map showing the positions occupied by the investing troops on the 27th August.

The subjoined table shows the positions of the corps on the two days in question:—

	3 A.M. 18th August.		31st August.
1st Corps.	Concentrated at Courcelles-sur-Nied and Laquenexy, S.E. of Metz.	..	Extended from Failly to Laquenexy about 5½ miles.
2nd „	Had set out one hour previously from Pont-à-Mousson for Buxieres.	..	Neighbourhood of Briey, Valleroy, and Auboue, 12 miles N.W. of Metz.
3rd „	Vionville and Buxieres	..	Between Conflans and Doncourt.
7th „	Concentrated at Ars and neighbourhood.	..	From Pouilly to W. of Vaux, 6 miles.
8th „	Concentrated at Gorze, 31st Brigade at Arry.	..	Extended from Rozerieulles to Saulney, 7½ miles.
9th „	Flavigny	..	Pierrevillers and Montois la Montagne, N.W. of Metz.
10th „	Tronville	..	Semecourt and Maizieres, N. of Metz.
12th „	Mars-la-Tour & Puxieux.	..	No longer with the Army.
Guard.	Hannonville.		
3rd Res. Div.	Not joined	..	Malroy, N. of Metz.
1st Cav. Div.	Corny, S. of Metz ..	..	Habonville W. of Metz.
3rd „ „	Coin les Cuvry between Moselle and Seille Rivers.	..	On both banks of Seille.
5th „ „	Tronville.	..	No longer with the Army.
6th „ „	Vionville.		
Guard (less one brigade)	Tronville and Hannonville.		
Sax. Cav. Division.	Parfondrupt.		

The tactical portion of the work has been thoroughly revised, and the views of outposts differ *in toto* from those given in the previous editions, being a brief epitome of General Hamley's pamphlet on the subject. L. A. H.

Manuel du Soldat d'Infanterie. Publication de la Réunion des Officiers. Tanera. Rue de Savoie. Paris, 1878. Price 75 centimes. Weight under 3½ oz. Size 3½″ × 5¼″ × ¼″. Pp. 175.

In the form of question and answer the whole duty of an infantry soldier is drawn up in simple language, under the heads of the profession of arms, interior economy, maintenance of arms, firing, garrison duty, railway transport, field service, hints on sanitary matters. It is much to be wished that some little manual of this character were put together and circulated in our own service, at a price within the means of the private soldier. In this latter respect we have much to learn from Continental publishers.

Les Transformations de l'Art de la Guerre. Publication de la Réunion des Officiers. Tanera. Paris, 1878. Price 2½ francs. Weight under 7 oz. Size 9″ × 5½″ × ½″. Pp. 136.

A brief sketch of the progress made in various branches of military art, such as the formation of armies, logistics, tactics, strategy. Although interesting there is not much that is new in this work.

Renseignements sur l'Artillerie de la Marine et sur l'Artillerie de Côte de l'Italie. Par M. H. de Poyen, Chef d'Escadron de l'Artillerie de la Marine. Tanera. Paris, 1878. Price 3 francs. Weight under 4½ oz. Pamphlet. Pp. 48.

This work is of special interest to Naval Officers, giving as it does full details of the artillery employed by Italy, in her fleet and on her coasts.

Renseignements Sommaires sur l'Artillerie Danoise. Tanera. Paris, 1878. Price 2 francs. Weight under 3 oz. Pamphlet. Pp. 40.

An account of the artillery used in the Danish service; naturally it is not of the same importance as the work last noticed.

Note.—The works published by M. Tanera can be obtained either direct from him by Post-Office Order payable at Paris, or through Messrs. Dulau, 37, Soho Square, London. M. Tanera's address is Rue de Savoie, 6, à Paris.

Dislokations-Karte der Kriegsmacht des Deutschen Reichs im Frieden. Entworfen nach den besten Quellen. Von E. von Tröltsch, Hauptmann. Stuttgart. Verlag von Karl Aue. 1879. Price 6*s*. Size 3′ 6″ × 2′ 8″. Weight under 8 oz.

This is a valuable map, on a scale of $\frac{1}{1760000}$, showing the positions of the naval and military forces of Germany in peace time. In some instances the position of single squadrons is shown.

Jahresberichte über die Veränderungen und Fortschritte im Militairwesen. Vierter Jahrgang, 1877. Mittler. Berlin, 1878. Price 7*s*. Size 9¼″ × 6¼″ × ¾″. Pp. 412. Weight under 1 lb. 3 oz.

This résumé of the work done in the military world during the year 1877, both in the field or in preparation for the field, is very valuable and deserves careful perusal. The scope of this publication was fully explained in No. 87 of this Journal. Colonel von Löbell still retains the editorship.

Military Sketching and Reconnaissance. By Lieutenant-Colonel F. J. Hutchinson and Captain H. G. Macgregor, being the first volume of Military Handbooks for Regimental Officers, edited by Lieutenant-Colonel C. B. Brackenbury, Superintending Officer of Garrison Instruction. London: Kegan Paul & Co. 1878. Price 6*s.* Size $6\frac{3}{4}'' \times 4\frac{3}{4}'' \times \frac{1}{2}''$. Pp. 121. Weight under 8 oz.

FROM the preface we learn that this is a "really elementary book." It is intended for Officers who do not want to become surveyors.

Amidst the chaos of existing systems of sketching and of text books on the subject, it is difficult to fix the exact relative value of this little work.

All these attempts to diffuse information are valuable. At p. 109, &c., is a course of field sketching, reconnaissance of ground for non-commissioned officers of infantry, cavalry, and artillery. This course is, in our opinion, too extensive and might judiciously be cut down.

A Primer for Horse, Field, and Mountain Artillery. By T. H. Lloyd, Captain Royal Artillery. Boddy: Woolwich, 1878. Price 1*s.* 8*d.* Size $7\frac{1}{2}'' \times 5'' \times \frac{1}{4}''$. Pp. 64. Weight under 5 oz.

ANOTHER useful and simply written work to facilitate the instruction of non-commissioned officers and gunners of horse, field, and mountain batteries.

L'Année Militaire. Revue Annuelle des faits relatifs aux Armées Française et Etrangères. Première Annexe. 1877. Paris: Librairie Militaire, Berger, Levrault, et Cie. 1878. Price 4 francs. Size $7\frac{1}{2}'' \times 4\frac{3}{4}'' \times 1\frac{1}{2}''$. Pp. 542.

THIS work is similar in character to that edited in Germany by Colonel von Löbell. It is avowedly incomplete in this its first year of issue, but if the editor can, in succeeding years, bring it up to the standard set by Colonel von Löbell, he will have rendered an invaluable service to those to whom German, if not a sealed book, is a language to be read with difficulty only.

The History of the Honourable Artillery Company. By Captain G. A. Raikes, 3rd W.Y.L.I. Militia, Lieutenant-Instructor of Musketry H.A.C., Author of "Historical Records of the First Regiment of Militia." Vol. 1. R. Bentley & Son. London, 1878. Price 31*s.* 6*d.* Size $9'' \times 6\frac{1}{2}'' \times 2\frac{1}{2}''$. Pp. 491. Weight under $3\frac{1}{4}$ lbs.

CAPTAIN RAIKES is making good use of his connection with the Artillery Company, towards continuing his histories of the reserve forces.

This volume is full of interest and is plentifully furnished with excellent maps and illustrations.

The Armies of Asia and Europe, embracing Official Reports on the Armies of Japan, China, India, Persia, Italy, Russia, Austria, Germany, France, and England. By Emory Upton, Brevet Major-General United States Army. New York: D. Appleton & Co. 1878. Price 14*s.* Size $9'' \times 6\frac{1}{4}'' \times 1\frac{1}{4}''$. Pp. 385. Weight 1 lb. 12 oz.

GENERAL UPTON was, in June, 1875, commissioned by the Secretary of War of the United States to proceed, accompanied by two other Officers, to the Old World, to examine and report upon its Armies. Denmark, Norway and Sweden, Spain and Portugal were not, however, to be included in the examination. The task was a gigantic one; but it would seem, from the letters of instructions given in the first pages of the volume, that Asia, with the European rival Powers contending therein, was the field about which most information was wished for. More than a third of the book is devoted, therefore, to the Armies of Japan, China, India, and Persia.

The whole book, which, however, contains only that portion of the report already issued, gives, in a comparatively small space, a great amount of valuable information extremely useful for reference. General Upton's conclusions also merit careful study. Special reports on cavalry and artillery are promised.

Tir Incliné de l'Infanterie. Par E. Paquié, Chef de Bataillon au 40me Régiment de Ligne. Paris: Dumaine. Price 4 francs 50 cents. Pamph. Pp. 249.

Des Effets de la Mousqueterie selon le Terrain et les Formations. Par V. Legros, Capitaine au 43me Régiment de Ligne. Paris: Tanera. Price 2 francs. Pamph. Pp. 102.

Although the youngest born of the children of military art, long-range infantry fire already possesses quite a literature of its own. Besides the works of Horsetsky, von Hornthal, Grossmann, Tellenbach, Boguslawski, and others, which deal with the general question, a lively discussion has been going on for some time in France as to the manner in which its introduction has affected the occupation of ground, and more especially as to the value of commanding positions for the defence.

This discussion arose originally from a sentence in the *Manuel de l'Instructeur de Tir*, which runs:—"Fire directed from low against high ground will sometimes "present certain advantages. If the enemy occupies a plateau, every bullet which "grazes the crest will sweep the surface over a zone often very extensive."

Taking this for his text, Major Paquié has written his book to show that, under no circumstances is high or dominating ground advantageous to the defence, and that one of the chief causes of the French defeat in the war of 1870–71 was their habitually choosing the crests of such positions for their principal line of defence.

Although we may not agree with the author in the whole of what he says, there can be no doubt that he has thrown considerable light on many points connected with the occupation of ground, and that, in a great degree, what he states is true. He considers that the *chief* line of defence should not be placed on the crest, because, although such a position is favourable for seeing and firing on an enemy so far as the front line of infantry is concerned, yet the supports and reserves in rear would also be within the effective sphere of fire. Moreover, that artillery so placed come too quickly within the range of infantry fire. He concludes, therefore, that the true front of the position is to be found from 500 to 800 yards in rear of the crest, and that it will be better if the ground slopes gently down towards it from the crest itself.

Such opinions are doubtless opposed in great measure to what has hitherto been believed and taught on the subject; our space does not permit us to more than thus briefly indicate the scope of our author's work; but we can recommend it to our readers as a clear and well written statement of his side of this question.

Captain Legros takes the opposite and hitherto more generally held view on the subject. His arguments are also plausible and well put, but are not couched in the same simple language as his opponent's. However, the two works should be read together, in order to come to a fair conclusion on this extremely important question—one which cannot be too quickly argued out and settled.

The second part of Captain Legros' brochure deals with the question of infantry formations as affecting loss. It may be looked upon as a technical extension of Major Tellenbach's well known pamphlet "On the art of manœuvring under the "enemy's fire with as little loss as possible," and is, so far as we are aware, the only work of the kind in existence.

It is, doubtless, difficult to theorise on such a subject as this; but, to come to any just notions as to the best formation for attack, it is evidently necessary to deal with it; and if our author has erred somewhat on the side of theoretical detail, he has nevertheless contrived to throw a good deal of light on a very important question.

W. H. J.